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U.S. Patent 5,128,984

5,128,984

U.S. Patent Number 5,128,984
Inventor: Ronald A. Katz
Issue Date: July 7, 1992

All claims of U.S. Patent No. 5,128,984 are invalid in light of the following prior art:

- Moosemiller, John. P. "AT&T CONVERSANT I Voice System" *Speech Technology,* Mar./Apr. 1986 pp. 88-93;
- U.S. Patent No. 5,199,062 ("Von Meister *et al.*");
- Steven C. Grant and Yvonne Brooks Grant, *The Teleconnect Guide to Automatic Call Distributors*, 2d Ed. January 1985, ("The Teleconnect Guide");
- *Special Feature: The Automated Switchboard Attendant in The Telemanagement Report*, pp. 49-56, Vol. 2, No. 5 (15), June 1984 ("The Telemanagment Report");
- The following collection of documents published by U.S. Computer System (doing business as "CableData"), which will collectively be referred to hereinafter as "Via Cable":
  - Via Cable, Vol. 2, No. 7 (November 1982);
  - Via Cable, Vol. 3, No. 1 (December/January 1983); and
  - CableData U.S. Computer System Annual Report (1982); and
- The following collection of documents, which will collectively be referred to hereinafter as "Viacom Cable":
  - Letter from Douglas Semon, Director of Engineering, New Technology Development, Viacom Cable to Mr. Semir Serazi, CATV Division, Zenith Electronics Corp., dated February 22, 1985;
  - Letter from Andrew Paff, Manager, New Business Development to Donna Brickell, Project Manager, Pacific Bell, dated May 21, 1985;
  - *A Trial of a National Pay-Per-View Ordering and Billing System,* published by the 1986 Convention Technical Program Committee of the National Cable Television Association (March 1986);
  - Viacom Cable Memo dated May 30, 1986;
  - Customer Interface User Manual dated October 18, 1986;
  - Viacom Memo dated November 26, 1986;
  - Undated document entitled "Pacific/CATV Hybrid Pay-Per-View Feature"; and
  - Undated document entitled "U.S. West ANI Order Entry".

Accompanying this submission, please find one or more claim charts applying one or more of the above cited prior art references being applied to one or more claims from U.S. Patent No. 5,128,984.

Accompanying this submission, please find one or more claim charts illustrating double patenting.

Accompanying this submission, please find a copy of *Ronald A. Katz v. AT&T Corp.*, 63 F.Supp.2d 583 (E.D. Pa. 1999), in which that court construed some elements of patent claims issued to Ronald A. Katz and a copy of *Marlow Indus., Inc. v. Igloo Prod. Corp.*, No. 02-1386, 2003 WL 21212626, (Fed. Cir. May 23, 2003)(unpublished).

Pursuant to 37 U.S.C. §1.555, "each individual associated with the patent owner in a **reexamination** proceeding has a duty of candor and good faith in dealing with the [Patent] Office, which includes a duty to disclose to the Office all information known to that individual to be material to patentability in a reexamination proceeding" (*See* 37 U.S.C. §1.555 and MPEP 2280)(emphasis added). "Informing the examiner of the pending infringement action is not commensurate with bringing to the examiner's attention the districts court's prior claim construction of the patent or disclosing the court orders embodying this construction. *See Rohm & Haas Co. v. Crystal Chem. Co.*, 722 F.2d 1556, 1572-73, 220 USPQ 289, 302 (Fed. Cir. 1983) (concluding that a presumption that an examiner was able to find, with his expertise and adequate time, the critical data when he was presented with a **"mountain of largely irrelevant data"** ignores the real world conditions under which examiners work)." *Marlow Indus., Inc. v. Igloo Prod. Corp.*, No. 02-1386, 2003 WL 21212626, at *2-3 (Fed. Cir. May 23, 2003)(unpublished)(*See Fed. Cir. Rule 47.6*)(emphasis added).

Pursuant to 37 U.S.C. §1.555, we believe that the prior art, decisions, opinions, orders, and arguments associated with the following proceedings may be pertinent:

- *West Interactive Corp. v. First Data Resources Inc.*, 1991 WL 355059 (D. Neb. July 22, 1991);
- *First Data Resources Inc. v. West Interactive Corp.*, No. 91-CV-4471 (C.D. Cal. August 20, 1991);
- *West Interactive Corp. v. First Data Resources Inc.*, 972 F.2d 1295 (Fed. Cir. 1992);
- *Ronald A. Katz Tech. Licensing, LP v. AT&T, Corp.*, No. 97-CV-539 (D. Neb. Oct. 27, 1997);
- *Ronald A. Katz Tech. Licensing, LP v. AT&T, Corp.*, No. 98-CV-88 (D. Neb. Mar. 2, 1998);
- *Ronald A. Katz Tech. Licensing, LP v. AT&T Corp.*, 63 F.Supp.2d 583 (E.D. Pa. 1999);
- *Ronald A. Katz Tech. Licensing, LP v. Micro Voice Applications Inc.*, No. 99-CV-592 (N.D. Cal. Feb. 8, 1999);
- *Enhanced Global Convergence Serv., Inc. v. Ronald A. Katz Tech. Licensing, LP*, No. 01-CV-375 (D. N.H. Oct. 5, 2001);
- *Verizon Cal., Inc. v. Ronald A. Katz Tech. Licensing, LP*, No. 01-CV-9871 (C.D. Cal. Nov. 16, 2001);
- *Enhanced Global Convergence Serv., Inc. v. Ronald A. Katz Tech. Licensing, LP*, No. 02-CV-66 (D. N.H. Feb. 2, 2002);
- *Ronald A. Katz Tech. Licensing, LP v. Verizon Communications Inc.*, 2002 WL 1565483 (E.D. Pa. July 16, 2002);
- *Ronald A. Katz Tech. Licensing, LP v. Verizon Communications Inc.*, 2002 WL 31834833 (E.D. Pa. Dec. 18, 2002); and
- *Ronald A. Katz Tech. Licensing, LP v. Verizon Cal., Inc.*, No. 03-CV-1918 (C.D. Cal. Mar. 18, 2003).

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Claim 1: U.S. Patent No. 5,128,984

Claim Elements	The Prior Art – Moosemiller, John. P. "AT&T's CONVERSANT I Voice System." *Speech Technology* – Mar./Apr. 1986 pp. 88-93
A **telephone call processing system**	"In September 1985, AT&T Conversant Systems introduced the CONVERSANT I Voice System, a voice response and speech recognition product for the growing market of automated information services." (p. 88). "This system accesses data bases via the public telephone network." (p. 88).
for receiving calls from a **multitude of terminals**	"Telephones, rotary or touch-tone, can become instant terminals." (p. 88). "Depending on the system's configuration, it can service up to 80 simultaneous calls." (p. 89).
in **different call modes** including an "800" call mode and a "900" call mode	The system is capable of providing the caller with a variety of interactive operating modes. (See Fig. 2, p. 90). Generic software (transaction state machine) is controlled by application software (transaction scripts) in processing data. As shown on p. 88, formats include financial services, credit authorization, and sales order entry. Pay to dial call modes and toll free call modes were well known billing options at the time of Katz's original disclosure. In fact, the pay to dial call mode merely signifies a charge for a service billed by the telephone company: "Although a local 900 call is free, the customer is billed for the service provided at the other end of the line." ("900 Party Line Speaks Angry Words." *The Record*, April 15, 1988). Such billing options were available at least as early as 1980 when viewers of a presidential debate were able to cast a vote for the debate "winner" by dialing one of two 900 numbers. (See *United Press International*, November 3, 1980). "Callers access the system through touch-tone signals, speaking isolated words and connected digit strings or by using modems and data terminal equipment." (p. 88).

Material claim element terms are in **bold**. Corresponding prior art disclosure is underlined.

Claim 1: U.S. Patent No. 5,128,984

to an **interface format** and **involving digital signals** associated with said terminals as for identification or data, said system comprising:	"The trunk interface answers an incoming call and communicates this to the system controller via the GPIB. Transaction software determines what greeting phrase to play. This is followed by a prompt to dial '1' for tone input." (p. 88).
first response unit means for receiving calls in said "800"call mode;	Moosemiller discloses a system with many voice response units (VRUs). (See Fig. 1 on p. 89). The transaction state machine and transaction software can use DNIS (the called number) to control the VRU. For example, a VRU may function differently if the called number is an "800" number. Dependent upon the dialed number, the TSM instructs the VRU as to which interactive format to speak. "Many different scripts may reside in the system and be executed concurrently. Which script to run is determined by the telephone number that was dialed…" (p. 91).
qualification means for qualifying said calls in said "800" call mode received by said first response unit to provide qualified calls;	Moosemiller describes how speech recognition technology can be used to qualify callers. Described is "an automatic means of confirming the identity of a claimant based on historical speech patterns." (p. 90). Qualification can be completed using touch-tones, spoken words, spoken digits etc. "The following example illustrates logging into a service by voice entry or numeric ID." (p. 91).
second response unit means for receiving calls in a second call mode;	Moosemiller discloses a system with multiple VRUs. (See Fig. 1, p 89). "Depending on the system's configuration, it can service up to 80 simultaneous calls and run different types of transactions concurrently." (p. 89). Further, DNIS is used by the TSM to classify a call. Each call is then "greeted by appropriate transaction prompts." (p. 88). "Transaction software determines what greeting phrase to play." (p. 88).

Claim 1: U.S. Patent No. 5,128,984

means **for processing calls** in an interface format; and	"The application programmer is responsible for the host application layer. Interactive communication with an external host computer is typical, but not absolutely necessary since the application may access a local data base on the system disk. Either way, some modules must be developed to process the content of data messages supporting the application." (p. 91).
means for coupling said qualified calls and said calls in a second mode to said means for processing.	"The trunk interface answers an incoming call and communicates this to the system controller via the GPIB. Transaction software determines what greeting phrase to play. This is followed by a prompt to dial '1' for tone input; the voice response unit is attached, if not already dedicated, and commanded to play the phrases and collect touch-tone signals." (p. 88).

5,128,984	5,014,298
Issue Date: July 7, 1992 Expiration Date: July 7, 2009	Issue Date: May 7, 1991 Expiration Date: May 7, 2008
15. A telephone interface system for individually interfacing callers at a multitude or remote terminals for voice-digital communication through a telephone communication facility, said system comprising: communication means for establishing telephone communication with currently active callers at certain of said terminals through said telephone communication facility; means for providing identification signals to said communication means indicative of said currently active callers, said means for providing identification signals comprising means for providing at least a portion of the digits associated with a remote terminal for identification; memory means for storing caller cues and use indications for said caller cues in relation to said callers as identified by said identification signals; cue means for receiving said caller cues to provide voice signals through said communication means to prompt responses from said currently active of said callers in the form of digital data signals; and means for selecting a current caller cue from said memory means for one of said currently active callers for application to said cue means under control of said identification signals for said one of said currently active callers and said use indications in said memory means for said one of said currently active callers.	1. A voice-data control system of use with a communication facility including remote terminals for individual callers, wherein said remote terminals may comprise a conventional telephone instrument including voice communication means for providing audio response signals and digital input means for providing digital response signals, said control system comprising: cue means for cueing select ones of said terminals to prompt selective operation of said voice communication means and said digital input means at said terminals to provide responsive signals; status means to selectively indicate responsive signals from each select terminal as digital control signals, digital data signal or audio signals; memory means for storing individual caller data; means for retrieving individual caller data from said memory means in response to control signals from said digital input means; control means for actuating said cue means and said status means to cue and identify responsive signals in relation to the operation selectively prompted by said cue means; and means for storing audio signals for reproducing audio caller voice data and responsive to cueing by said cue means under control of said status means.
16. A system according to claim 15 wherein said means for providing at least a portion of the digits includes means for receiving automatic number identification (ANI) signals.	7. A system according to claim 1 wherein said means for retrieving individual caller data from said memory means responds to signal representations of the caller's number to access said memory means.
	8. A system according to claim 7 wherein said signal representations of the caller's number comprise ANI signals from said communication facility.

5,128,984	**4,930,150**
Issue Date: July 7, 1992 Expiration Date: July 7, 2009	Issue Date: May 29, 1990 Expiration Date: December 20, 2005
20. A telephone interface system for individually interfacing callers at a multitude of remote terminals for voice-digital communication through a telephone communication facility, said communication facility providing number identification (ANI) signals indicative of the number for a calling remote terminal, said system comprising: preliminary communication means for establishing preliminary telephone communication with callers at said terminals to receive said number identification (ANI) signals; memory means for storing at least one predetermined sequence of select digits representative of only a portion of at least one of the numbers for identifying remote terminals means for testing said predetermined sequence of select digits against a select portion of a number for a calling terminal as represented by said number identification (ANI) signals for a current caller to provide a control signal; and means for accepting calls for interface communication beyond said preliminary telephone communication from said terminals in accordance with said control signal.	1. An interface control system for use with, (1) a communication facility including remote terminals for individual callers, wherein said remote terminals may comprise a conventional telephone instrument including voice communication means and digital input means for providing data, and (2) a multiple port, multiple format processor for concurrently processing data from a substantial number of callers in any of a plurality of format, said interface control system comprising; call data means for receiving calls from said remote terminals in association with ports of said multiple port, multiple format processor, said calls providing signal-represented call data to said call data means; selection means for selecting one format of said plurality of formats of said multiple port, multiple format processor, said selection means being controlled by said signal-represented call data from a calling remote terminal to thereby specify defined conditions for a connection to said multiple port, multiple format processor, at least one of said formats having at least one specified condition; test means for testing the specified defined conditions for a calling remote terminal to provide approval signals; and interconnect switch means for providing connections from the ports of said multiple port, multiple format processor to a calling remote terminal under control of said approval signal from said test means.

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AT&T's CONVERSANT™ I Voice System

This new voice response system, with its many telephone trunk interfaces, is targeted for the growing market of automated information services uses.

John P. Moosemiller
Member of Technical Staff
AT&T Bell Laboratories
Columbus, OH

IN SEPTEMBER 1985, AT&T Conversant Systems introduced the CONVERSANT™ I Voice System, a voice response and speech recognition product for the growing market of automated information services. This system accesses data bases via the public telephone network. Telephones, rotary or touch-tone, can become instant terminals eliminating the need for costly computer peripherals and providing easy availability.

The CONVERSANT I has many speech capabilities. Callers access the system through touch-tone signals, speaking isolated words and connected digit strings, or by using modems and data terminal equipment. The system responds with high-quality, natural-sounding speech using an advanced speech coding algorithm developed by AT&T.

CONVERSANT I applications include the following broad areas of information dissemination:

- financial services
- credit authorization
- wholesale and retail distribution
- sales order entry
- direct marketing
- transportation scheduling and dispatching
- college registration
- communication services

Hardware Architecture

The hardware architecture for the CONVERSANT I is flexible, expandable, and modular. It allows one to economically configure just the necessary voice channel capabilities. Additionally, the system controller and the voice switch can allocate speech processing units as needed, thus time-sharing them. For example, a catalog service user may log in with tone or speech recognition, download accumulated orders from a hand-held terminal to a system modem, leave a voice message for a supervisor via the real-time voice coder, and finally dial an attendant dispatcher, all within one use. It can be packaged from four to 80 channels.

The controller (Fig. 1) executes system software under the UNIX™ operating environment. Through this, local control of transactions is accomplished, along with substantial off-loading of host processing. Winchester disks provide ample storage for local data bases, coded speech, and system software. For reliability, these disks may be duplicated. Multiple data communication ports provide common data link protocols, including IBM 3270 BSC and SNA, and asynchronous ASCII TTY. The system controller communicates to intelligent and relatively autonomous speech subsystems via the IEEE 488 General Purpose Interface Bus (GPIB).

An internal voice switch supports the bridging of speech units to each incoming voice channel. One-to-many connections are possible. Four-wire continuity is preserved, permitting speech units to separately modify the signal gain for incoming and outgoing voice channels. The voice switch (Fig. 1) is the key to real-time allocation of speech processing hardware, which occurs under direction of the system controller via the GPIB. Simple system configurations, however, can make the voice switch unnecessary. For example, Fig. 1 shows voice response units directly connected to incoming trunk channels. Any speech processing units may be optionally bridged to incoming calls via the voice switch.

Most voice response systems only provide line interfaces to the telephone network, whereas the CONVERSANT I system adds many common trunk interfaces. Call supervision, the immediate knowledge of call progress and termination, is important for effective management of telecommunication costs and is possible only with trunks. The Dialed Number Identification Service (DNIS) has been used with a Direct Inward Dialing (DID) trunk interface to receive dialed digits as part of the call setup protocol. This allows advance classification of incoming calls for different applications which are greeted by appropriate transaction prompts. The DNIS feature is useful for service bureaus or for multiple-user applications.

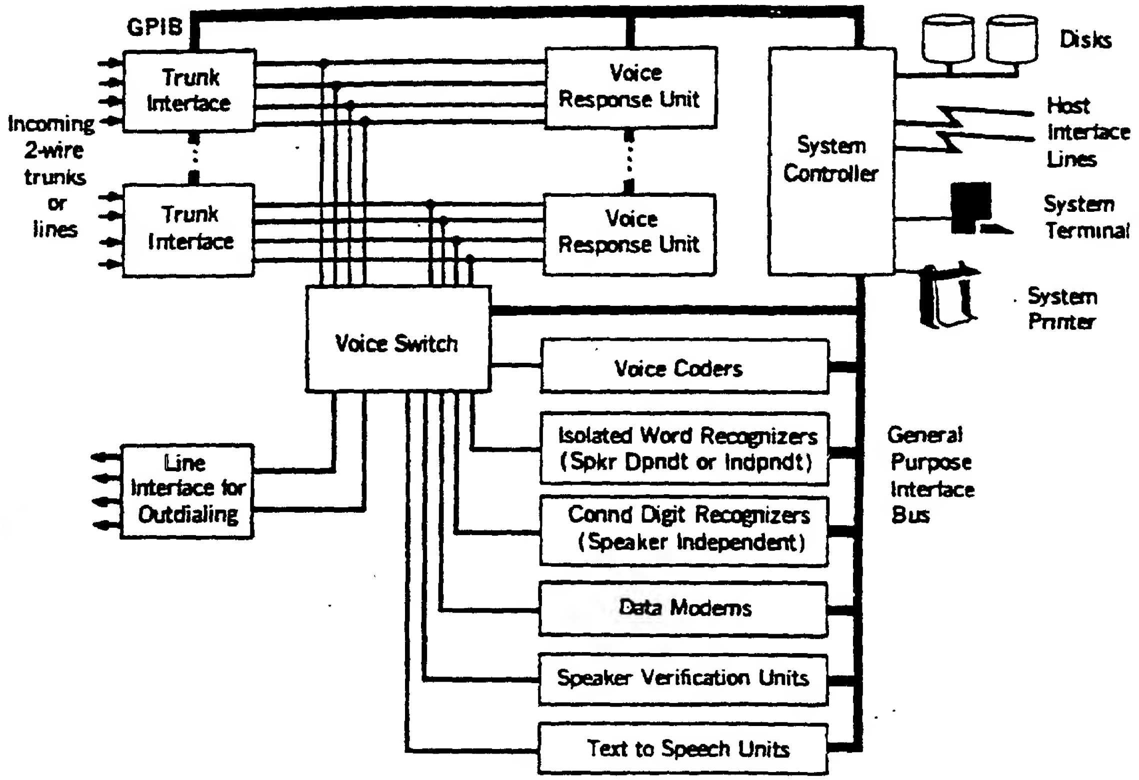
Most common analog trunk types and T1 digital carriers can be serviced through the system's telephone network interfaces. The system can dial out on lines and two-way trunks, and it can work in conjunction with Automatic Call Distributor and Private Branch Exchange systems. With direct trunk connections, though, the cost of the latter approach may be unnecessary.

The hardware architecture also allows for control of the speech subsystems and all subunits, including the switch and the network interfaces. This is done by the system controller using the GPIB. The following example illustrates this.

The trunk interface answers an incoming call and communicates this to the system controller via the GPIB. Transaction software determines what greeting phrase to play. This is followed by a prompt to dial "1" for tone input, the voice response unit is attached if not already dedicated, and commanded to play the phrases and collect touch-tone signals. If no tones are heard, the unit signals the controller over

Fig. 1

CONVERSANT™I VOICE SYSTEM ARCHITECTURE



the GPIB and it dictates the switch to bridge on a speech recognizer. The transaction continues to use the voice response unit to generate prompts and the speech recognizer to accept the user's voice commands. Transaction control and the speech subsystems management are performed by the system controller through the GPIB.

Design and Features

With the CONVERSANT I's flexible architecture, new features and channel capacity can be added as requirements change. It can operate standing alone or as a front-end processor to one or more host computers. The basic product uses touch-tone signaling and voice response. The internal voice switch bridges optional speech processing subsystems under direction of the system controller. Depending on the system's configuration, it can service up to 80 simultaneous calls and run different types of transactions concurrently.

Both telephone line and trunk interfaces are available, the latter providing direct call progress and supervision as part of the protocol exchanged with a central switching office. The system is capable of outdialing, bridging to an attendant for help or completing a partially automated transaction. In addition, CONVERSANT I's real-time voice coder allows customers to record daily messages and make minor response changes conveniently on site. The system can also support voice mail.

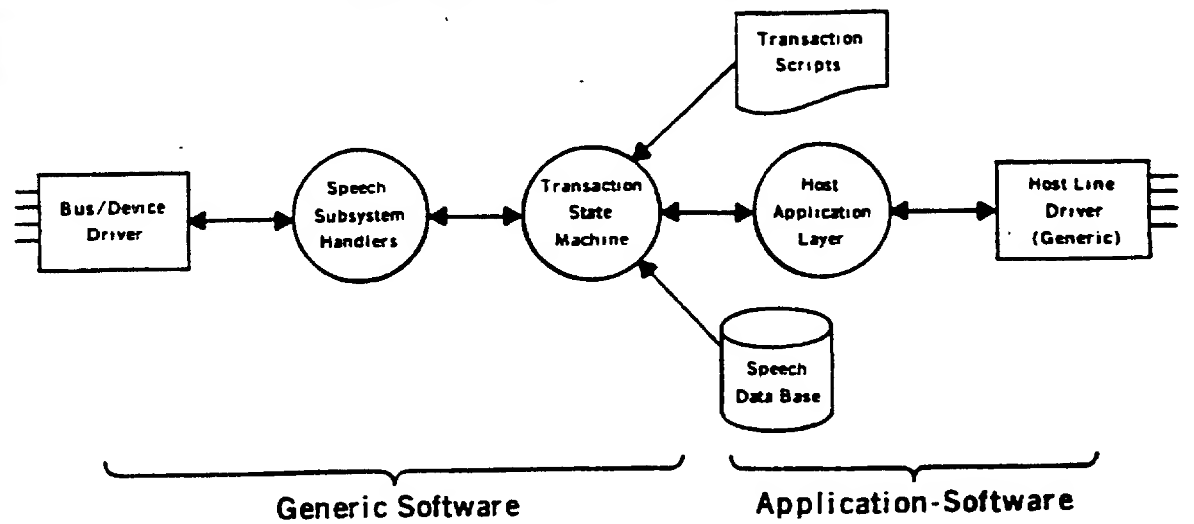
Voice recognition can be added to the basic product. Speaker independent and dependent recognition are available with both isolated and connected word capabilities. Automated services can be provided to rotary telephone users through speaker independent recognition of connected digit strings.

Features for reliability include backup disks, power supplies, and streaming tape drive. The system has built-in self diagnosis and will automatically reboot and recover if a severe operating problem is detected. Complete administrative and maintenance software tools are accessed through the system console or remote control.

When compared with traditional means of providing information services, the CONVERSANT I system is very cost effective. It reduces attendant costs through automation and provides revenue through new services that were previously uneco-

Fig. 2

CONVERSANT™ I SOFTWARE ARCHITECTURE



nomical.

Speech Processing Technologies

Three speech technologies—speech synthesis, recognition, and coding—are embodied in the CONVERSANT I. High quality speech playback is accomplished efficiently using Multi-Pulse Linear Predictive Coding (MPLPC) algorithms developed at AT&T Bell Laboratories [illegible] Good intelligibility is preserved at 9.6K bps, a rate compatible with the system's real-time voice coder. Studio quality occurs at rates approaching 14K bps. Each voice response unit has the capacity to store 400 seconds of MPLPC speech and virtually unlimited amounts of speech may be downloaded in real time from system disk storage. We have found that voice playback quality strongly influences users' perception of a service's worth. For this reason, our efforts have concentrated on synthesis by analysis of recorded speech, rather than synthesis by rule from text alone.

Both speaker independent and dependent speech recognition are possible, and isolated and connected utterances can be recognized. For speaker independent recognition, the vocabulary is currently limited to connected digit strings, isolated digits, and the words "yes" and "no." Robust recognition of telephone speech by the general public requires a substantial voice sampling effort [illegible]

Speech recognition is accomplished through statistical template matching with Dynamic Time Warping (DTW). AT&T Bell Laboratories has researched these algorithms for some time [illegible] In addition, acoustic phonetic algorithms enhance the decision process and identify words within connected speech. Since the transmission bandwidth of telephone networks is only about 3.3 kHz, telephone speech is first sampled at a frequency of 6.67 kHz. Front-end processing of the speech signal involves an 8-pole auto-correlation analysis which results in an efficient representation called Linear Predictive Coding (LPC). Recognition occurs by comparing LPC coefficients for the speaker's utterance—called the test template—with LPC coded words in the data base—the reference templates. Within thresholds, the unknown word is assumed to belong to the same class as the set of templates it most closely matches using Itakura's distance metric [illegible]

For many applications, such as voice mail, daily announcements, and feedback of speaker-dependent command words, it is desirable to provide real-time voice coding. The CONVERSANT I satisfies this need with a voice coder that converts an analog speech signal into 9.6K bps MPLPC in real-time. The converted speech may be stored in digital format on the system disk and played back through the voice response unit immediately or later.

Future Speech Technologies

Two other related technologies, speaker verification and text-to-speech synthesis, are under investigation. The first is an automatic means of confirming the identity of a claimant based on historical speech patterns. This capability exists as a working prototype. Second, text-to-speech, or rule-based synthesis from text, is necessary for applications with open-ended vocabularies, such as proper names and addresses. AT&T Conversant Systems is monitoring research that promises to advance text-to-speech performance, such as efforts to devise better pronunciation rules for foreign words in an English context. When significant improvements in text-to-speech are possible, AT&T Conversant Systems will incorporate them in the CONVERSANT I product. In the mean-

time, they will consider integrating other commercial text-to-speech units.

Application Software

Application software development may be done by AT&T Conversant Systems, a value-added reseller of the product, or the user. To facilitate development, clear delineations have been made between generic operational software and application software. In what follows, software architecture will be discussed in three areas: 1) applications development, 2) high-level script language used to define transactions, and 3) AT&T's experience in prototyping applications

■ Development

A simplified view of the CONVERSANT I's software architecture emphasizing the customizable parts for applications, is shown in Fig. 2. Central to the architecture is the transaction state machine (TSM) which, through a single process, controls all active sessions. Although the TSM is generic, it interprets transaction scripts. Many different scripts may reside in the system and be executed concurrently. Which script to run is determined by the telephone number that was dialed, the physical telephone circuit on which the call was received, or further interaction with the user (scripts can transfer control to other scripts). The TSM controls all speech subsystems through various handlers and drivers. The applications programmer does not have to know how these devices work; they exist only as logical entities implied by the functionality of the script language.

The application programmer is responsible for the host application layer. Interactive communication with an external host computer is typical, but not absolutely necessary since the application may access a local data base on the system disk. Either way, some modules must be developed to process the content of data messages supporting the application. It is possible to place all information in the transaction script when prototyping applications. Currently, the host application layer must be written as C language subroutines. The developer, however, does not have to be concerned about lower-protocol layers because they are handled by generic host drivers.

Although not strictly software, the speech data base, which prompts the end user or verbalizes retrieved information through the voice response units, must be considered part of the application. The transaction script language has built-in knowledge of how to access the speech data base and is acted upon by the TSM.

■ Transaction Script Language

AT&T Conversant Systems has developed a high-level language for defining transaction scripts, thus making it easy to prototype speech applications and maintain them. The script language lets the application developer treat the TSM as a virtual machine. Device control details are hidden and automatically managed.

Instructions in the TSM script language were designed specifically for voice transactions. They include voice response instructions that speak phrases, numbers, and characters—in sensible ways with flexible intonation. Other instructions collect the user's speech or touch-tone signals or mediate data base transactions with a remote host computer. The following example illustrates logging into a service by voice entry of a numeric ID

```
SCRIPT INSTRUCTION                         COMMENTS/ANNOTATION
MAIN:
  tfile ("/talk/script1")                  /*talk phrase xref file */
  LOGON ()                                 /*call LOGON subroutine */
  SERVICE ()
  BYE ()
LOGON:
  talk ("hello, welcome")                  /*say greeting phrase */
  talk ("please speak id")                 /*prompt for verbal input */
  getdig (DIG9, ch.LOGID,9)                /*collect 9-digit response */
  dbase (0, VERIF, ch.RESP,
    RESPLEN, ch.LOGID, LOGLEN)             /*verify host 0 data base */
  jmp (r.0 < im.0 no reply)                /*timeout on host? jump */
  talk ("account verified for")
  tchars (ch.RESP)                         /*confirmation string */
  rts ()                                   /*subroutine return */
SERVICE:
  rts ()                                   /*details not shown */
NO REPLY:
  talk ("sorry, service is unavailable, try later")
BYE:
  talk ("thank you for calling")
  quit ()
```

The flexible architecture of the CONVERSANT I system makes instructions for allocating devices appropriate. For example, a speech recognizer may bridge on only if the caller does not have a tone signaling telephone. Additional instructions for flow control and data manipulation provide a complete programming environment.

Using the high-level TSM script language, we have repeatedly implemented complex transaction sessions in a few pages of textual instructions. It has also been shown that transaction software written in the C language can be converted to script format with a resultant compression factor of 10 or more. Mnemonics are employed throughout scripts to reference encoded speech files, data structures, and subroutine labels. Because of these factors, the transaction script language is an effective tool for application developers and a

readable and maintainable definition of the application.

■ **Prototyping**

AT&T Conversant Systems has developed applications by first prototyping them. This is done by quickly generating a transaction script that simulates the initial concept, complete with dialog, but with little or no host application layer. By prototyping, the customer receives early exposure to the target transaction. It provides an easy way of retrying the simulation until it is substantially correct. The applications AT&T Conversant Systems has prototyped include: stock quotations, catalog ordering, airline reservations, dial-it information menus, caller destination control, and telephone banking.

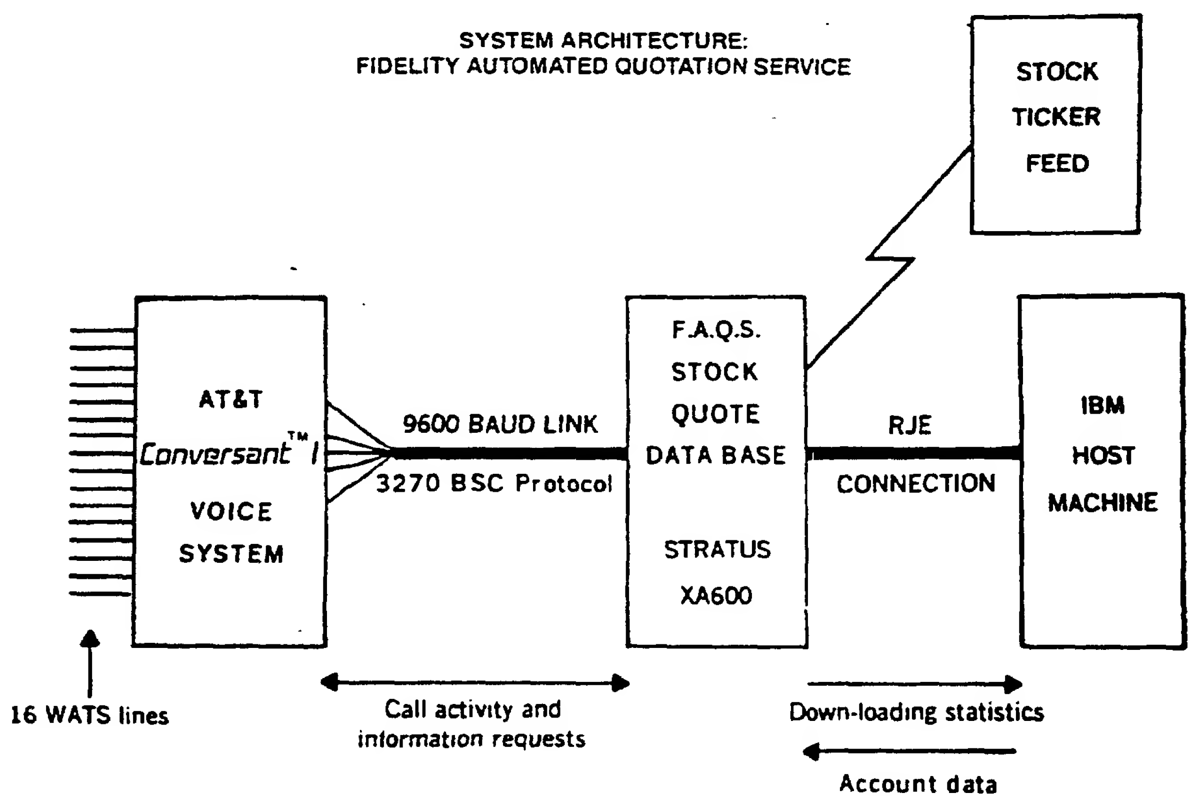
Several considerations go into prototyping and application development. Most important, though, is the user model. Successful implementation of the application depends upon three factors:

- easy access and utility
- adequacy and necessity of information provided
- minimal connect time

The last attribute is important to the service provider because it reduces telecommunication costs. It is also significant to the end users who weigh their time against alternative sources of information. In assessing application success, one must bear in mind the end user's short-term memory capacity and how information processing restraints affected it. For instance, input prompts should state or strongly imply the valid responses, such as "yes" or "no," at the end of the message. Retrieved data, such as numbers that must be spoken as a series of individual words, may be unintelligible if attention is not given to prosody (rhythm) and intonation. Poor intelligibility increases the information processing load on the user and reduces attention to the main task. The transaction script language aids prototype development by providing built-in intonation and pronunciation rules for numeric and character strings.

Once the application concept is defined, a familiar series of steps result in functional data requirements, flow diagrams, and transaction dialog. Prototyping gives the developer early feedback on human factors of a voice transaction without having to fully implement data base interfaces and error handling.

Fig. 3



Stock Quotation Application

One application in use is AT&T Conversant Systems support of a stock quotation service for customers of Fidelity Brokerage Services, a major discount brokerage house in Boston. This represents the first commercial application of connected speech recognition in support of automated delivery of information services by telephone.

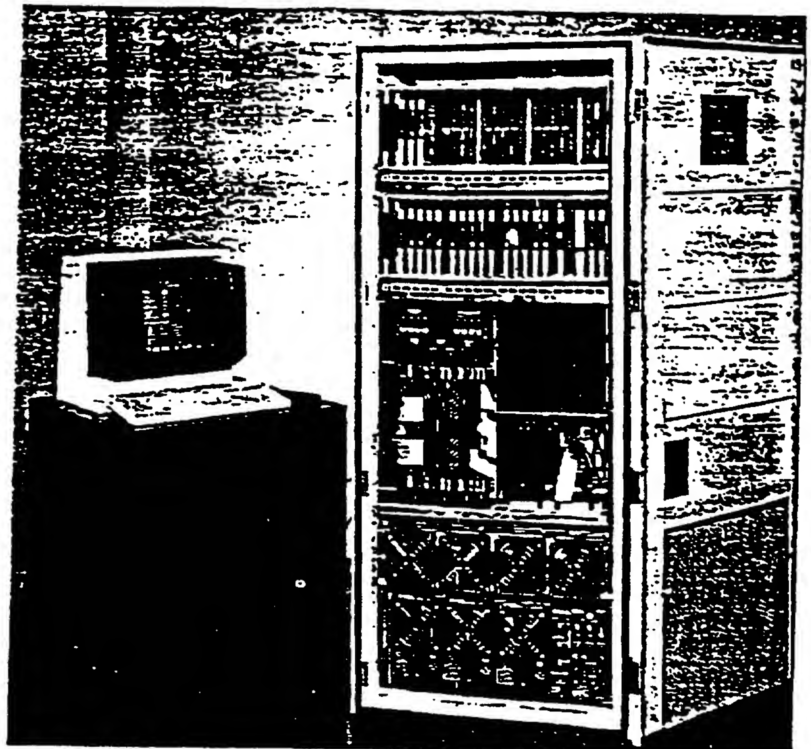
In this application the CONVERSANT I is a front-end processor to the service provider's quotation data base and a host computer with customer account information, as shown in Fig. 3. The service provides on-demand quotations for 6000 stocks, stock option quotations, a personal stock watch list for convenience, and the current Dow Jones Industrials Average. Transaction control is provided locally in the CONVERSANT I, that is, it determines how many quotes to provide per call and when to provide help messages. Only a few, carefully defined messages need be exchanged with the data base machine to support the application and they are strictly informational messages. They accomplish the following:

- LOG—validates user ID number, returns stock watch list
- DOW—returns Dow plus time and date
- STK—accepts stock number, then outputs ticker symbol, and quote
- OPQ—accepts option number with its month and strike price codes, outputs option quote
- OFF—logs off confirmation for each user session
- STA—uploads accumulated system transaction statistics

By offloading transaction control, the data base host can perform more effectively. The host also supports a personal computer service separate from this application. A multi-threaded data stream arrangement allows only a few physical lines to handle a much larger number of active sessions. The CONVERSANT I treats the data base host as an individual transaction server while also managing user sessions with its built-in state machine.

The user's contact with the quote service depends on a catalog which gives stocks numeric IDs. Current speech recognition capability permits nine-digit encoded strings made up of the words "one" through "nine" to map to 6000 items with a string accuracy greater than 95 percent. Redundancy and error correction are built into the coded strings. This numeric catalog approach has widespread applicability in the areas of order entry, menu selection and information retrieval.

Fig. 4



The CONVERSANT I System can operate alone or as a front-end processor to one or more host computers

Marketing Outlook

Since the AT&T CONVERSANT I Voice System provides conversational access to computer information from any telephone, it is flexible and efficient in supporting a range of input and output modalities. By marketing it through a variety of channels, AT&T plans to develop complete application solutions for business customer problems that arise.

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2. **S.D. Hester, H.M. McHugh, K.A. Vander-Meulen**, "The AT&T Multi-Mode Voice Systems—Full Spectrum Solutions for Speech Processing Applications," *Proceedings of the 1985 AVIOS Conference*.
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FOR MORE INFORMATION

Contact Chris D. Farrar, AT&T Conversant Systems, 6200 East Broad Street, Columbus, OH 43213 (614) 860-2272

US005199062A

United States Patent [19]

Von Meister et al.

[11] **Patent Number: 5,199,062**

[45] **Date of Patent: Mar. 30, 1993**

[54] **TELEPHONE COMMUNICATIONS SYSTEM INCLUDING A DIGITAL TELEPHONE SWITCH, A VOICE RESPONSE UNIT AND A STORED PROGRAM SEQUENCE FOR CONTROLLING BOTH THE SWITCH AND THE VOICE RESPONSE UNIT**

[75] Inventors: **William F. Von Meister**, Great Falls; **Mark Foster**, Falls Church, both of Va.

[73] Assignee: **Phone Base Systems Inc.**, Vienna, Va.

[21] Appl. No.: **789,398**

[22] Filed: **Nov. 8, 1991**

Related U.S. Application Data

[63] Continuation of Ser. No. 639,739, Jan. 11, 1991, abandoned, which is a continuation of Ser. No. 147,102, Jan. 20, 1988, abandoned.

[51] **Int. Cl.**[5] **H04M 3/50**; H04M 3/54; H04M 3/56; H04Q 11/04

[52] **U.S. Cl.** **379/67**; 379/89; 379/196; 379/205; 379/207; 379/211; 379/212; 379/216; 370/62

[58] **Field of Search** 379/88, 89, 67, 84, 379/201, 211, 213, 214, 233, 212, 202, 204, 205, 216, 196, 197, 198, 199, 355; 370/61, 62; 359/135-137, 165, 167

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Primary Examiner—Thomas W. Brown
Attorney, Agent, or Firm—Browdy and Neimark

[57] **ABSTRACT**

The present invention relates to a telephone communication system which includes a telephone switch having a plurality of incoming and outgoing lines for switching calls therebetween, an audio response unit for receiving audio communications from a user and for generating and transmitting voice communications, and a central processing unit for executing a stored program sequence based upon the audio communications received by the voice response unit to control both the voice response unit and the telephone switch. The central processing unit may be connected within the voice response unit or externally thereto.

43 Claims, 26 Drawing Sheets

Microfiche Appendix Included
(1 Microfiche, 79 Pages)

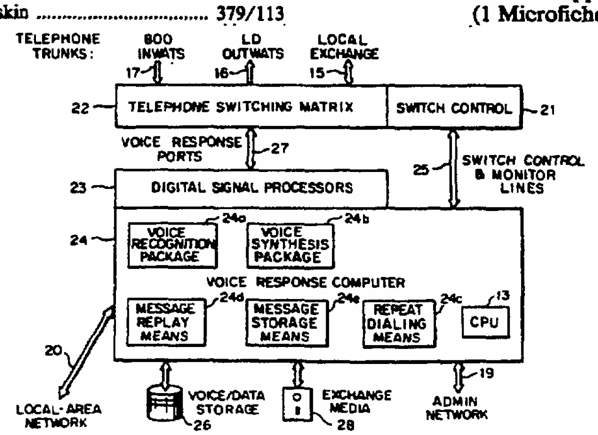


FIG. 1

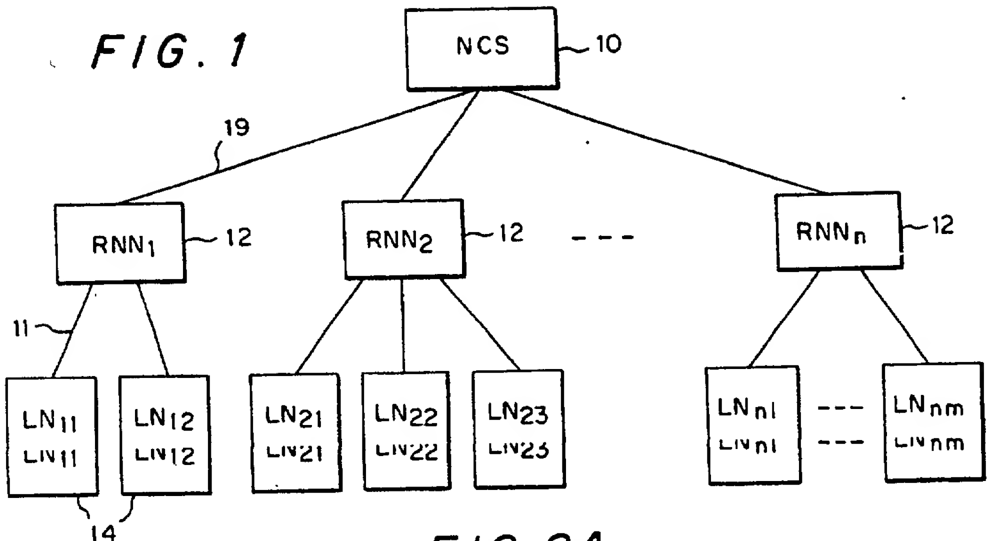


FIG. 2A

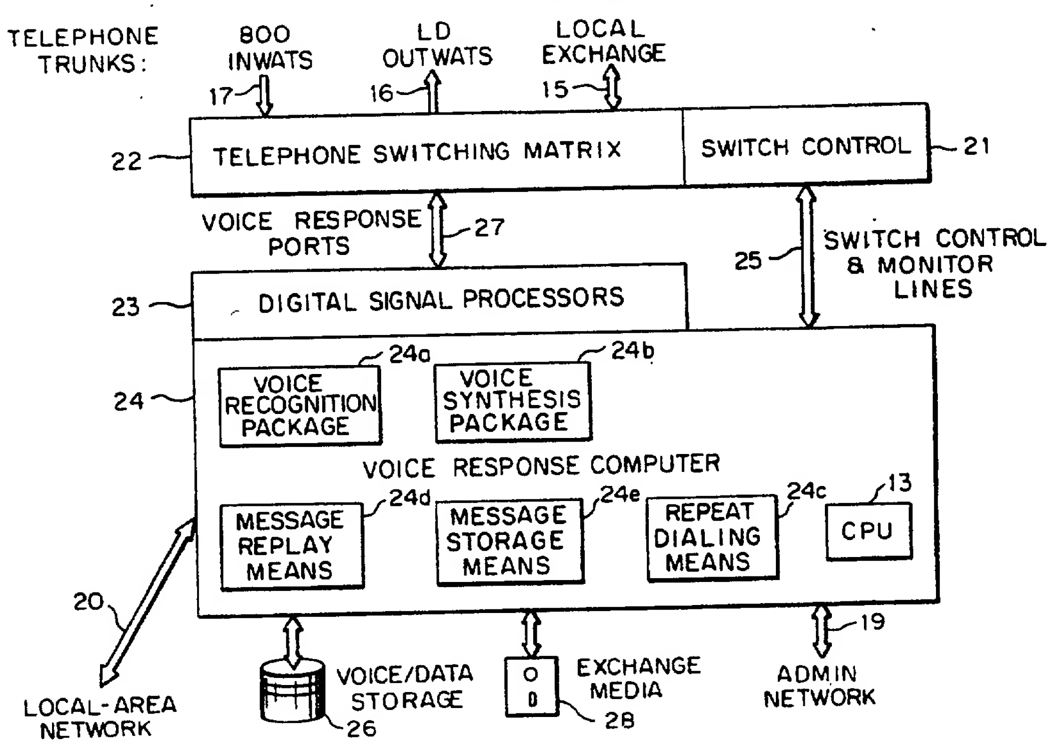


FIG. 2B

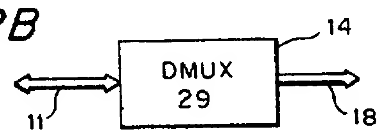
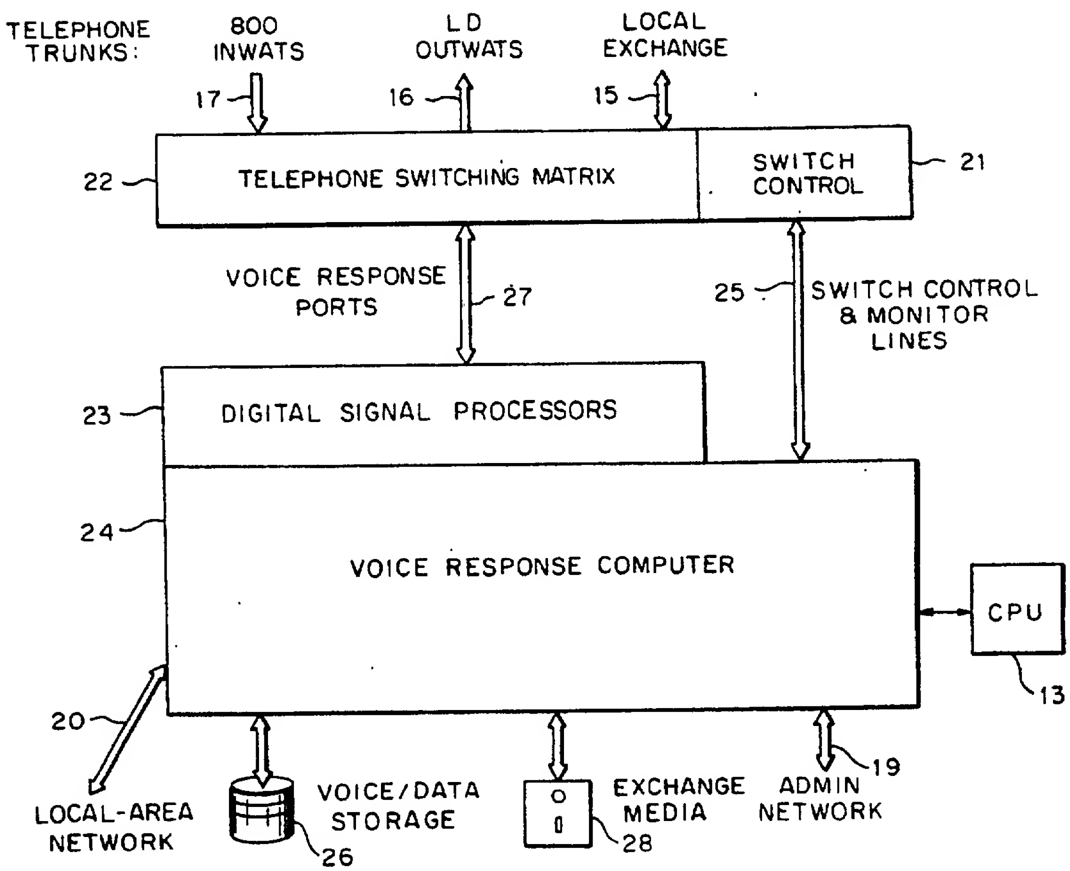


FIG. 2C


TELEPHONE TRUNKS:
800 INWATS
LD OUTWATS
LOCAL EXCHANGE
17
16
15
22
TELEPHONE SWITCHING MATRIX
SWITCH CONTROL
21
VOICE RESPONSE PORTS
27
25
SWITCH CONTROL & MONITOR LINES
23
DIGITAL SIGNAL PROCESSORS
24
VOICE RESPONSE COMPUTER
CPU
13
20
LOCAL-AREA NETWORK
VOICE/DATA STORAGE
26
EXCHANGE MEDIA
28
ADMIN NETWORK
19

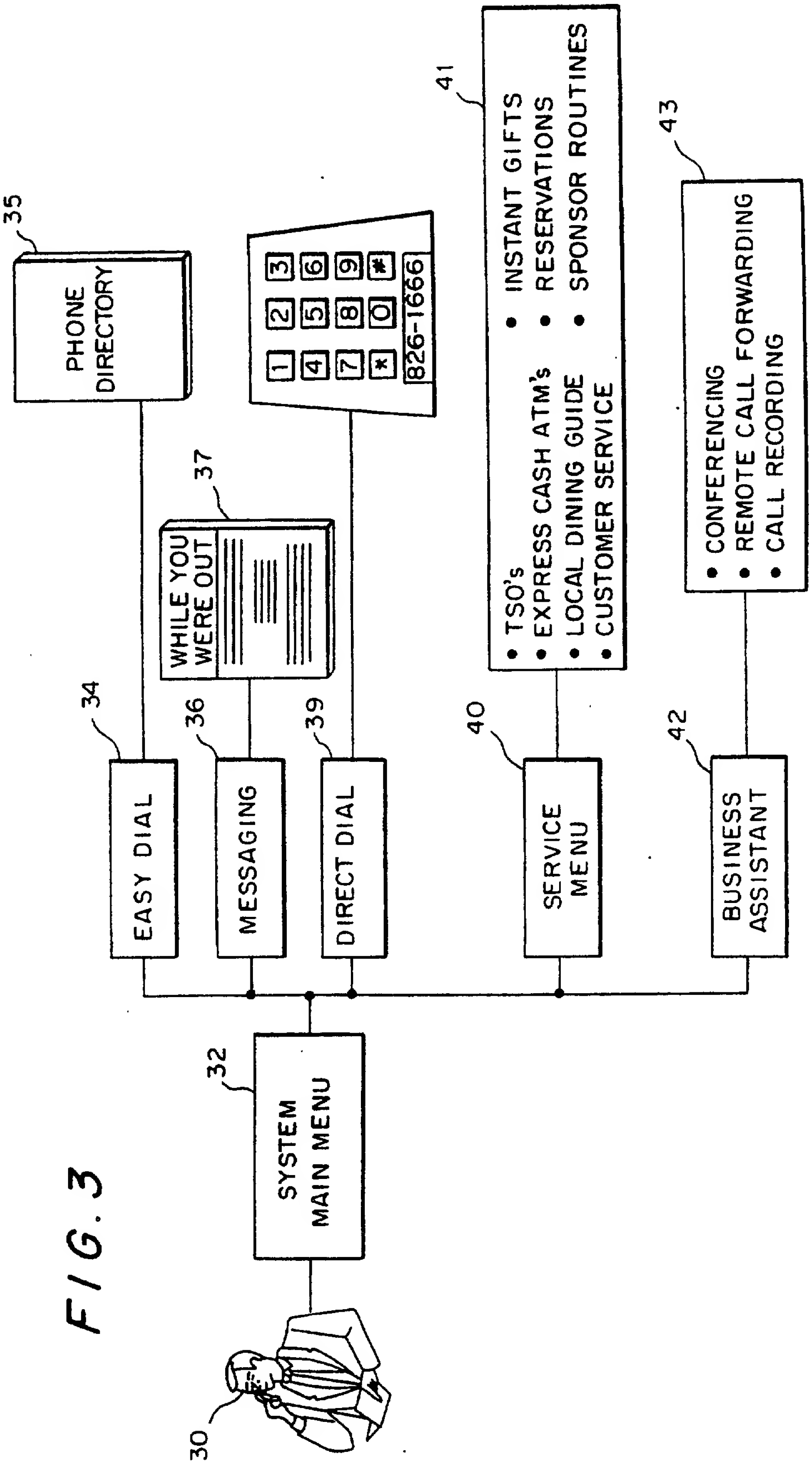
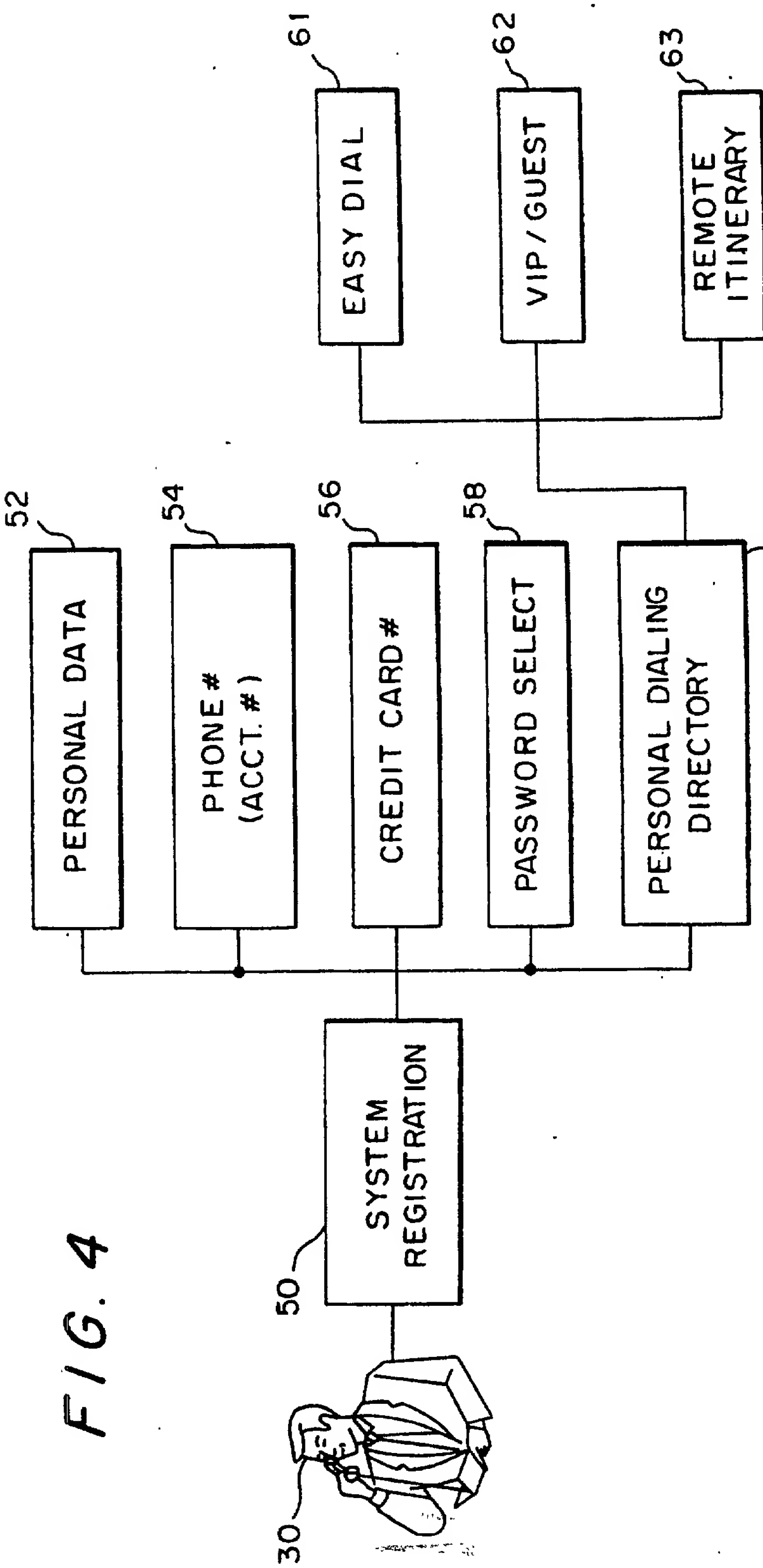

30
SYSTEM MAIN MENU
32
EASY DIAL
34
MESSAGING
36
DIRECT DIAL
39
SERVICE MENU
40
BUSINESS ASSISTANT
42
PHONE DIRECTORY
35
WHILE YOU WERE OUT
37
1 2 3
4 5 6
7 8 9
* 0 #
826-1666
• TSO's
• EXPRESS CASH ATM's
• LOCAL DINING GUIDE
• CUSTOMER SERVICE
• INSTANT GIFTS
• RESERVATIONS
• SPONSOR ROUTINES
41
• CONFERENCING
• REMOTE CALL FORWARDING
• CALL RECORDING
43

FIG. 3

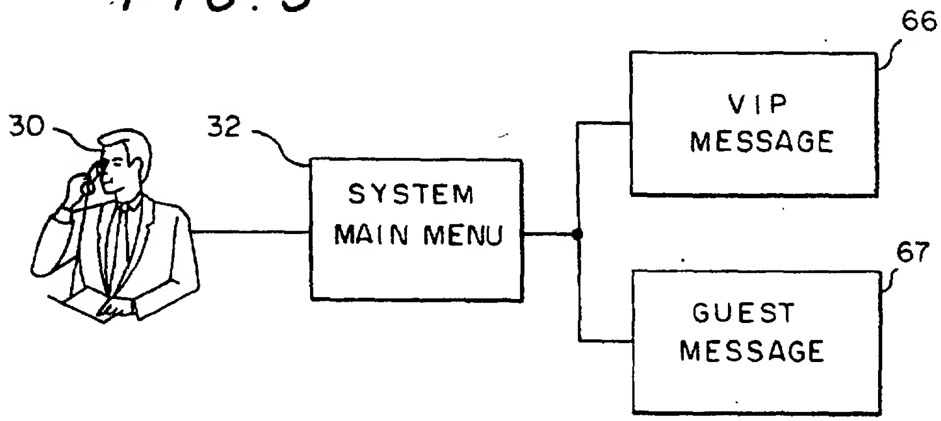
07425779.102389



EASY DIAL
61
VIP / GUEST
62
REMOTE ITINERARY
63
PERSONAL DATA
52
PHONE # (ACCT. #)
54
CREDIT CARD #
56
PASSWORD SELECT
58
PERSONAL DIALING DIRECTORY
60
SYSTEM REGISTRATION
50
30

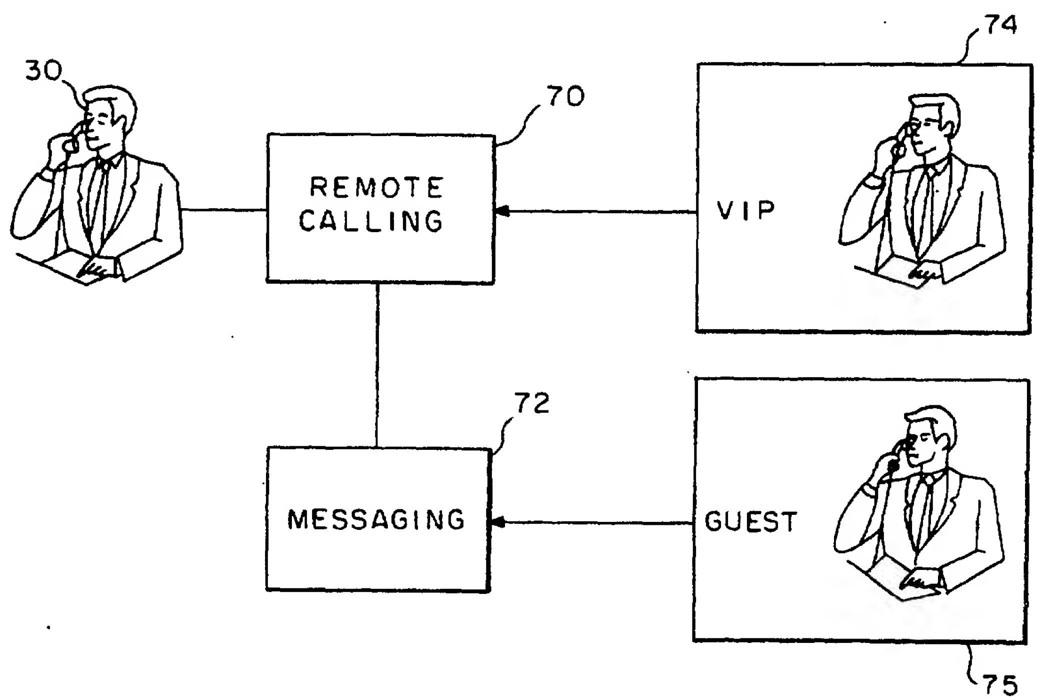
FIG. 4

FIG. 5



30
32
SYSTEM MAIN MENU
66
VIP MESSAGE
67
GUEST MESSAGE

FIG. 6



30
70
REMOTE CALLING
74
VIP
72
MESSAGING
GUEST
75

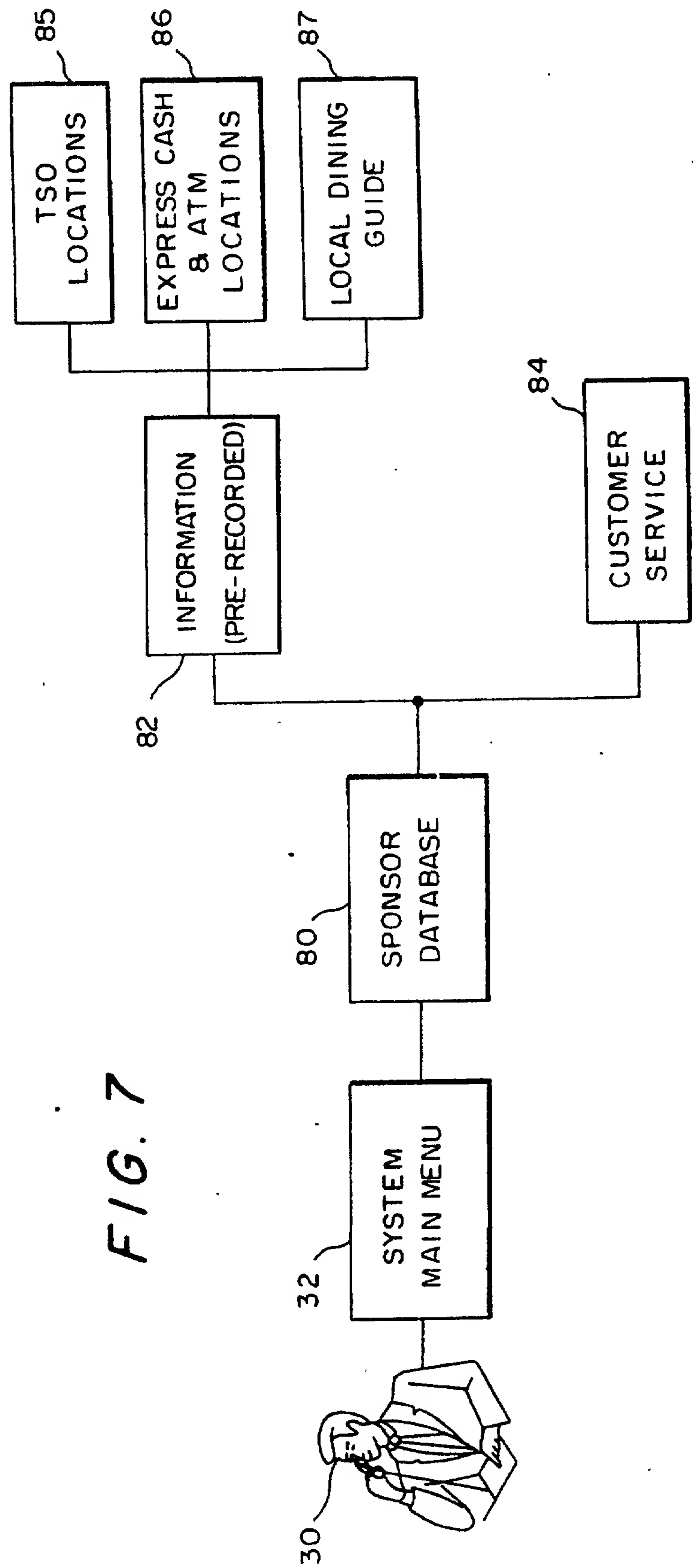

TSO LOCATIONS
EXPRESS CASH & ATM LOCATIONS
LOCAL DINING GUIDE
INFORMATION (PRE-RECORDED)
CUSTOMER SERVICE
SPONSOR DATABASE
SYSTEM MAIN MENU
85
86
87
84
82
80
32
30

FIG. 7

FIG. 8A

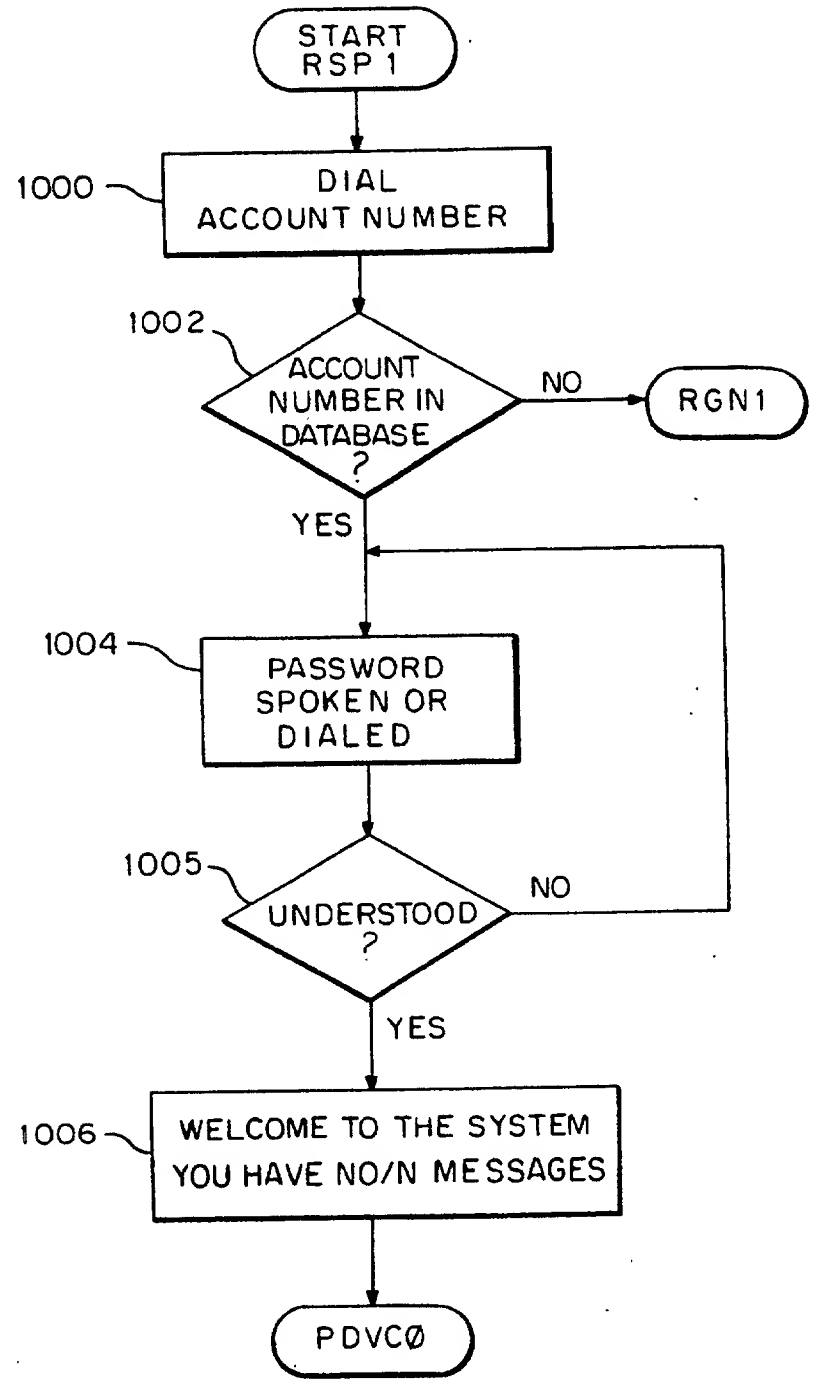

START RSP 1
1000
DIAL ACCOUNT NUMBER
1002
ACCOUNT NUMBER IN DATABASE ?
NO
RGN1
YES
1004
PASSWORD SPOKEN OR DIALED
1005
UNDERSTOOD ?
NO
YES
1006
WELCOME TO THE SYSTEM YOU HAVE NO/N MESSAGES
PDVCØ

FIG. 8B

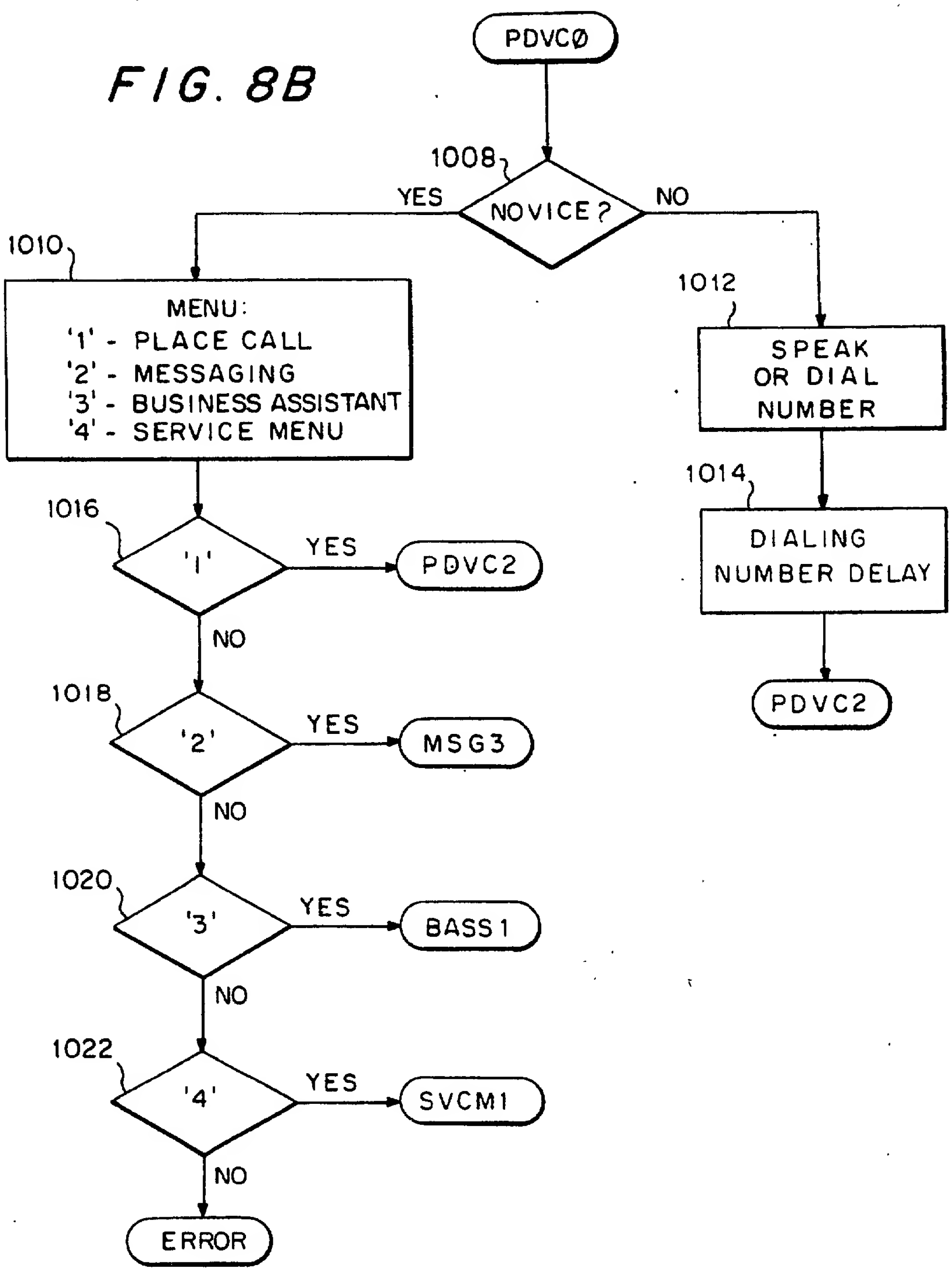

PDVCØ
1008
NOVICE ?
YES
NO
1010
MENU:
'1' - PLACE CALL
'2' - MESSAGING
'3' - BUSINESS ASSISTANT
'4' - SERVICE MENU
1012
SPEAK OR DIAL NUMBER
1014
DIALING NUMBER DELAY
PDVC2
1016
'1'
YES
PDVC2
NO
1018
'2'
YES
MSG3
NO
1020
'3'
YES
BASS1
NO
1022
'4'
YES
SVCM1
NO
ERROR

FIG. 9A

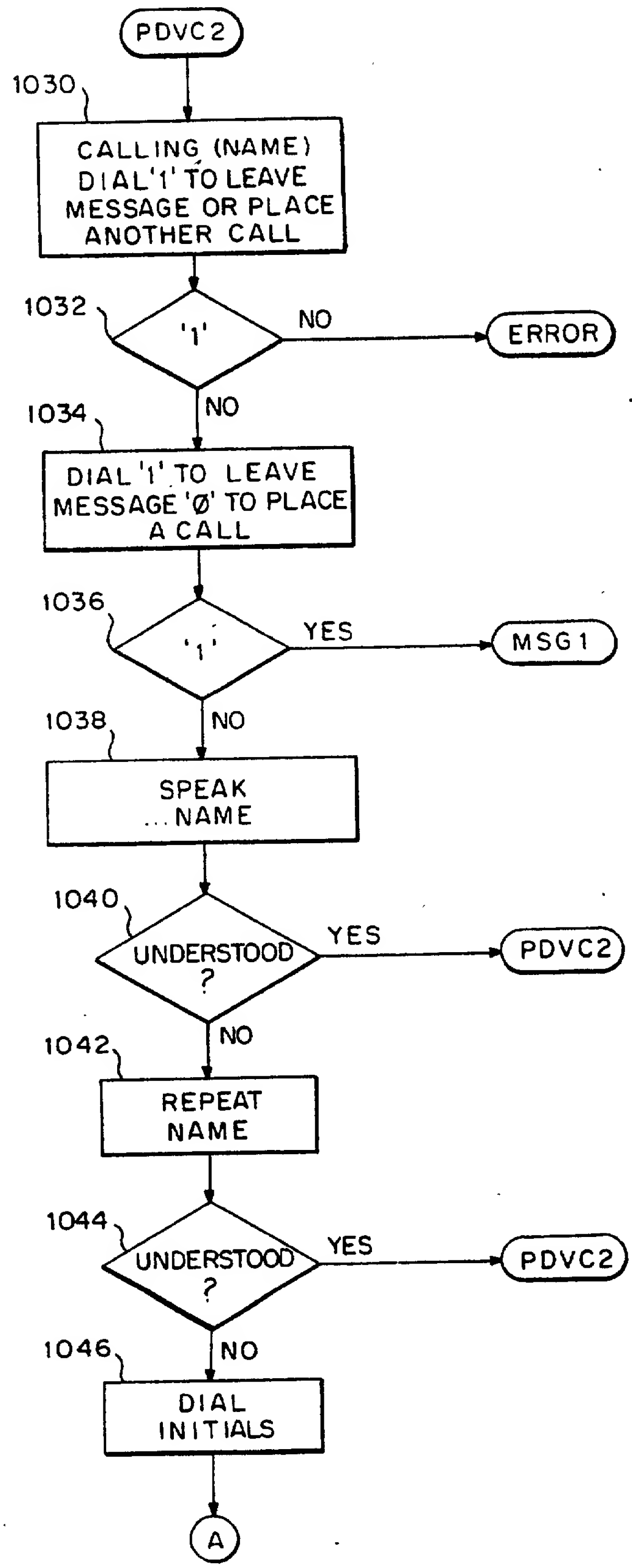

PDVC2
1030
CALLING (NAME) DIAL '1' TO LEAVE MESSAGE OR PLACE ANOTHER CALL
1032
'1'
NO
ERROR
NO
1034
DIAL '1' TO LEAVE MESSAGE 'Ø' TO PLACE A CALL
1036
'1'
YES
MSG1
NO
1038
SPEAK ...NAME
1040
UNDERSTOOD ?
YES
PDVC2
NO
1042
REPEAT NAME
1044
UNDERSTOOD ?
YES
PDVC2
NO
1046
DIAL INITIALS
A

FIG. 9B

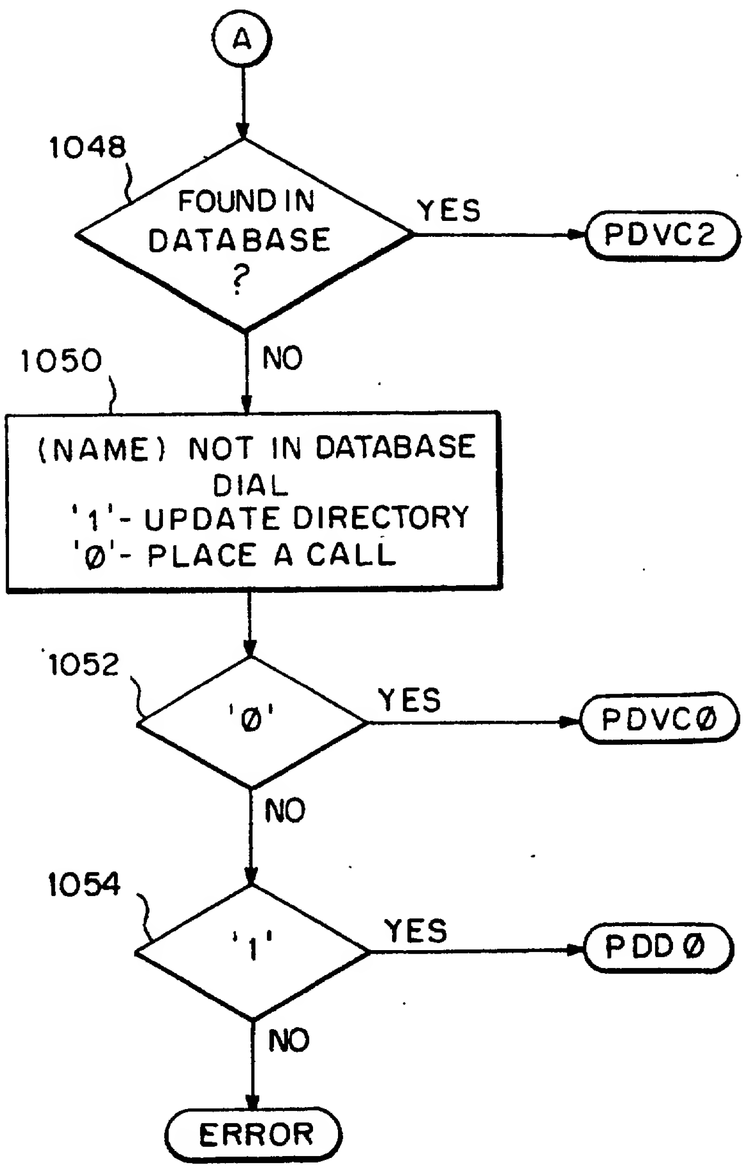

A
1048
FOUND IN DATABASE ?
YES
PDVC2
NO
1050
(NAME) NOT IN DATABASE
DIAL
'1'- UPDATE DIRECTORY
'Ø'- PLACE A CALL
1052
'Ø'
YES
PDVCØ
NO
1054
'1'
YES
PDDØ
NO
ERROR

FIG. 10A

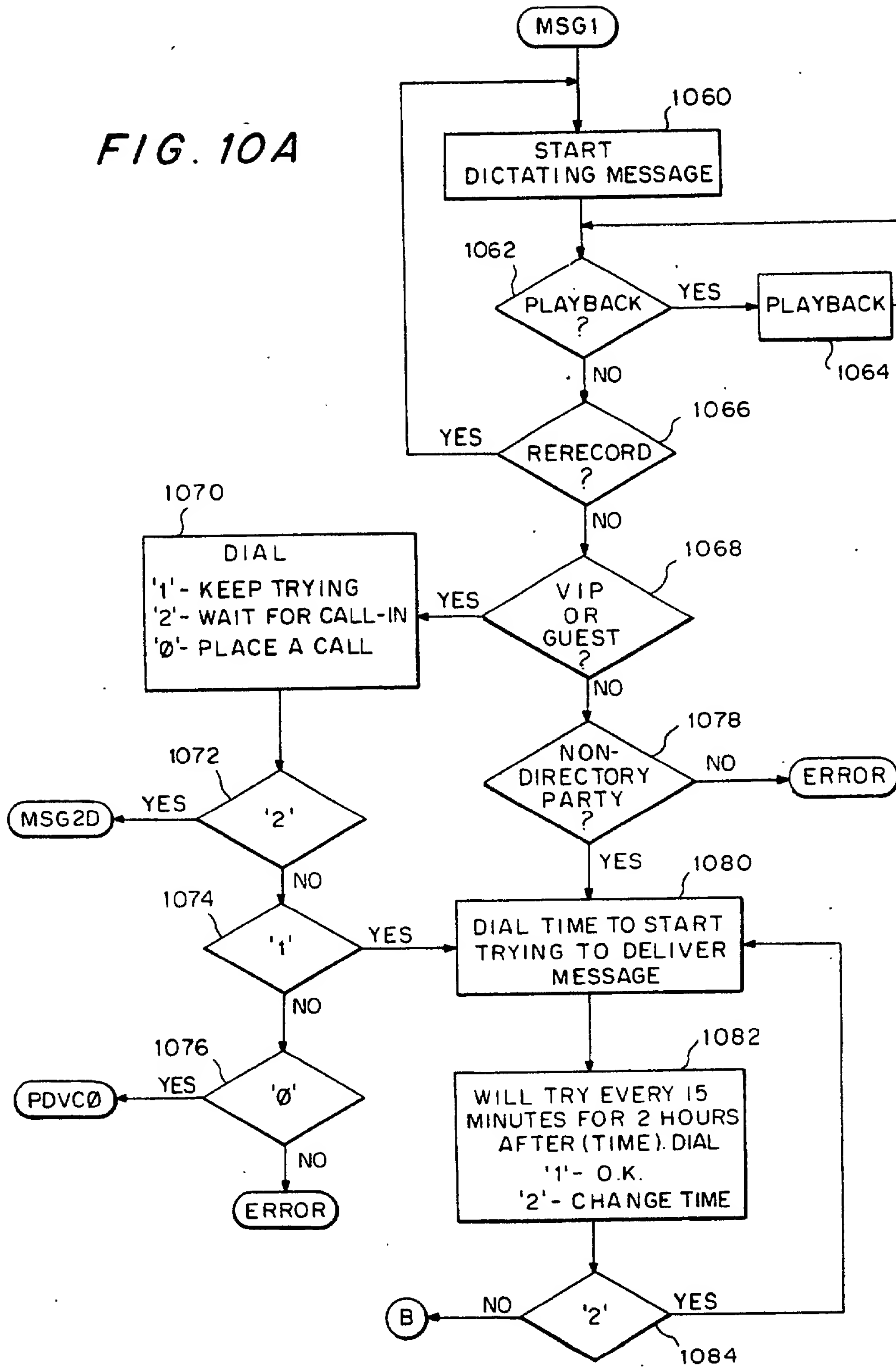

MSG1
1060
START DICTATING MESSAGE
1062
PLAYBACK ?
YES
PLAYBACK
1064
NO
1066
YES
RERECORD ?
NO
1070
DIAL
'1'- KEEP TRYING
'2'- WAIT FOR CALL-IN
'Ø'- PLACE A CALL
YES
1068
VIP OR GUEST ?
NO
1078
NON-DIRECTORY PARTY ?
NO
ERROR
1072
MSG2D
YES
'2'
NO
YES
1080
1074
'1'
YES
DIAL TIME TO START TRYING TO DELIVER MESSAGE
NO
1076
1082
PDVCØ
YES
'Ø'
WILL TRY EVERY 15 MINUTES FOR 2 HOURS AFTER (TIME). DIAL
'1'- O.K.
'2'- CHANGE TIME
NO
ERROR
B
NO
'2'
YES
1084

FIG. 10B

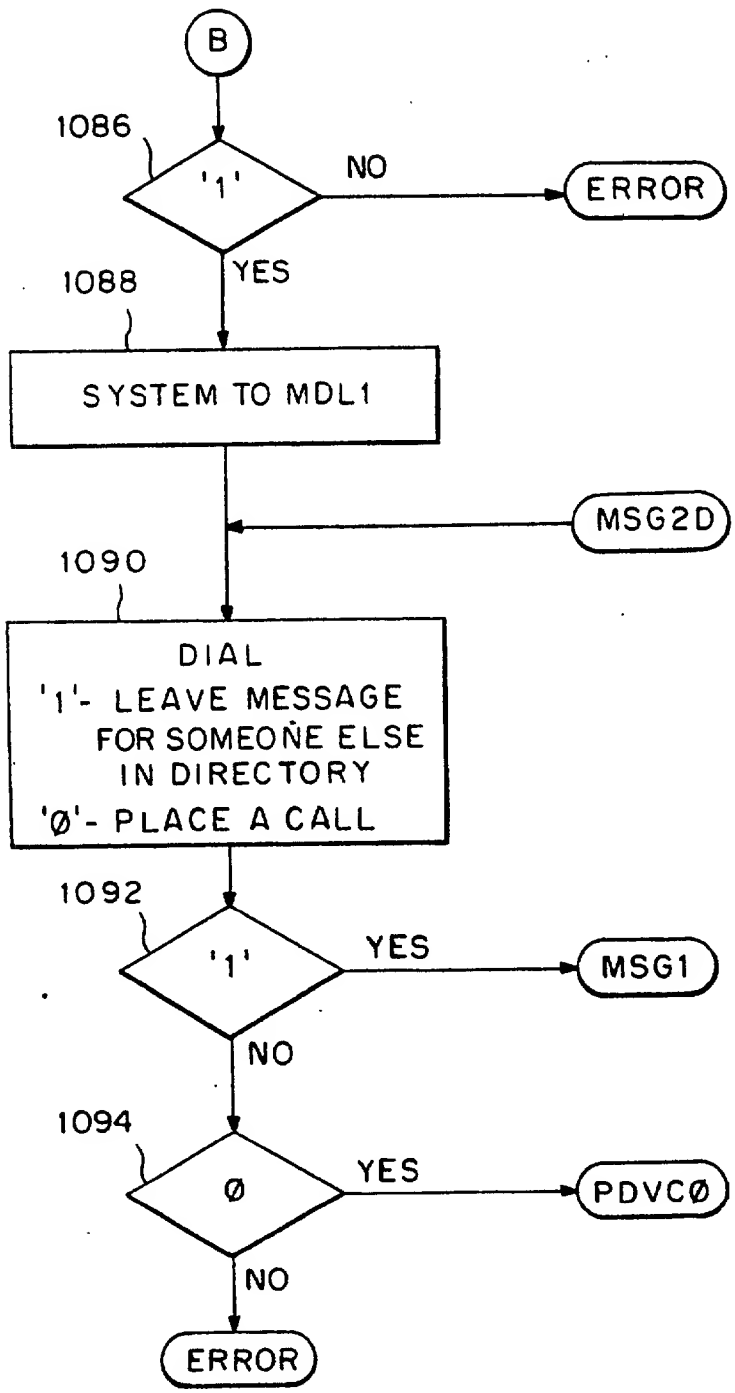

B
1086
'1'
NO
ERROR
YES
1088
SYSTEM TO MDL1
MSG2D
1090
DIAL
'1'- LEAVE MESSAGE
FOR SOMEONE ELSE
IN DIRECTORY
'Ø'- PLACE A CALL
1092
'1'
YES
MSG1
NO
1094
Ø
YES
PDVCØ
NO
ERROR

FIG. 11A

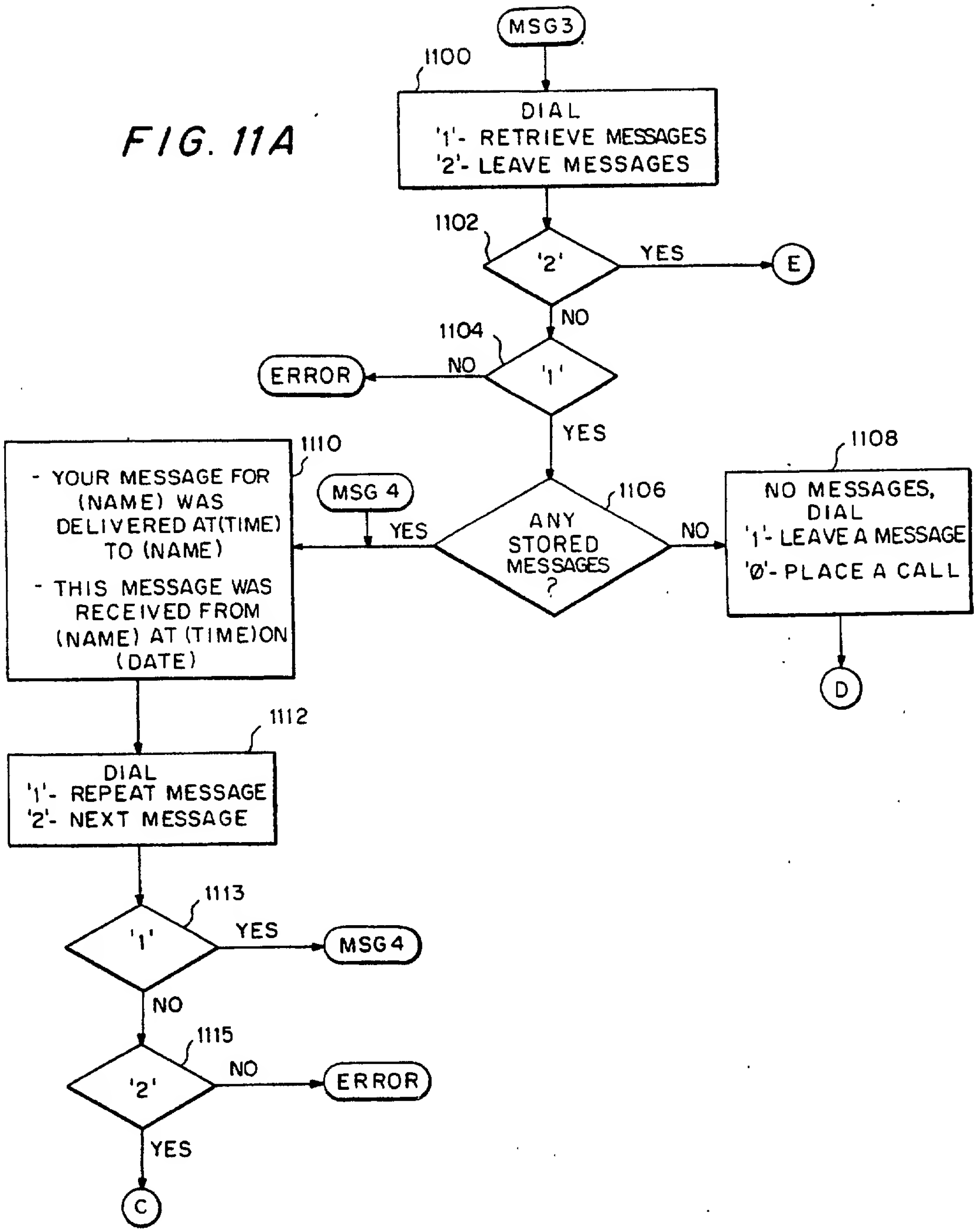

MSG3
1100
DIAL
'1'- RETRIEVE MESSAGES
'2'- LEAVE MESSAGES
1102
'2'
YES
E
NO
1104
'1'
NO
ERROR
YES
1110
- YOUR MESSAGE FOR (NAME) WAS DELIVERED AT(TIME) TO (NAME)
- THIS MESSAGE WAS RECEIVED FROM (NAME) AT (TIME)ON (DATE)
MSG 4
YES
1106
ANY STORED MESSAGES ?
NO
1108
NO MESSAGES, DIAL
'1'- LEAVE A MESSAGE
'Ø'- PLACE A CALL
D
1112
DIAL
'1'- REPEAT MESSAGE
'2'- NEXT MESSAGE
1113
'1'
YES
MSG4
NO
1115
'2'
NO
ERROR
YES
C

FIG. 11B

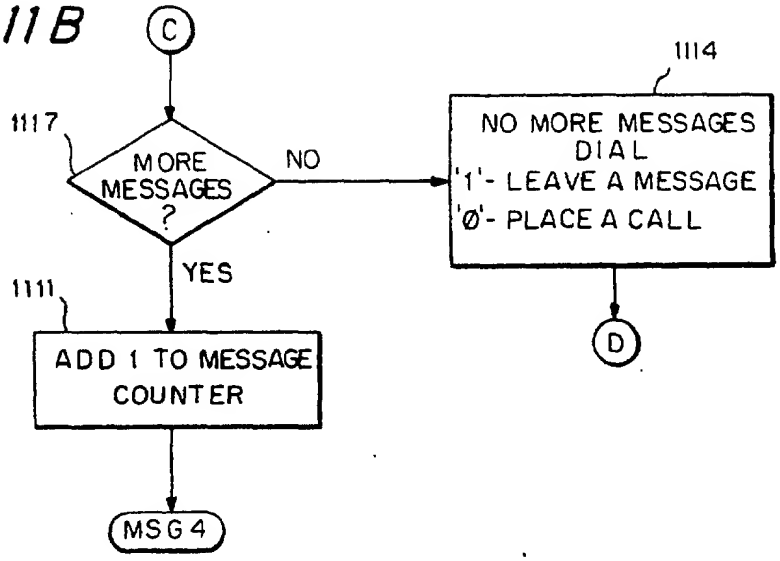


FIG. 11C

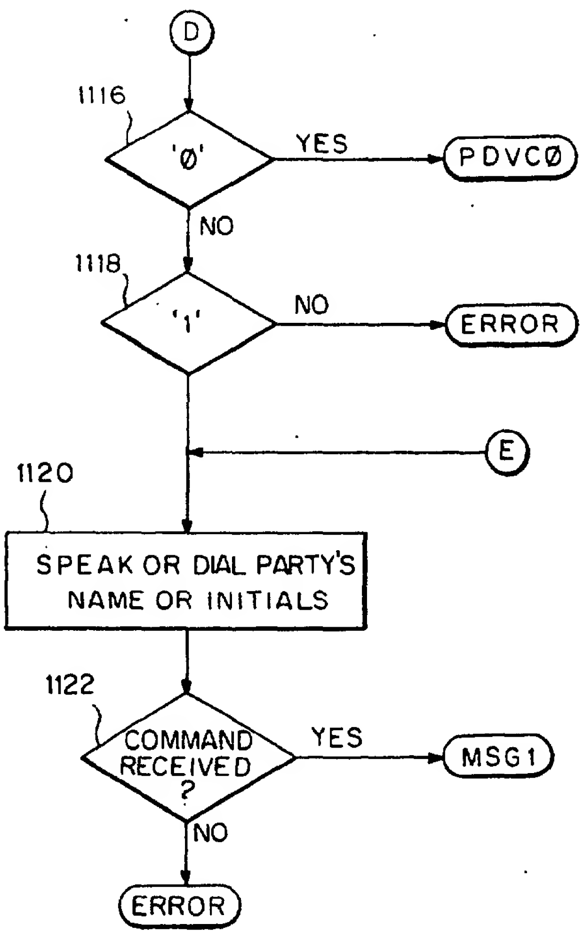


FIG. 12A

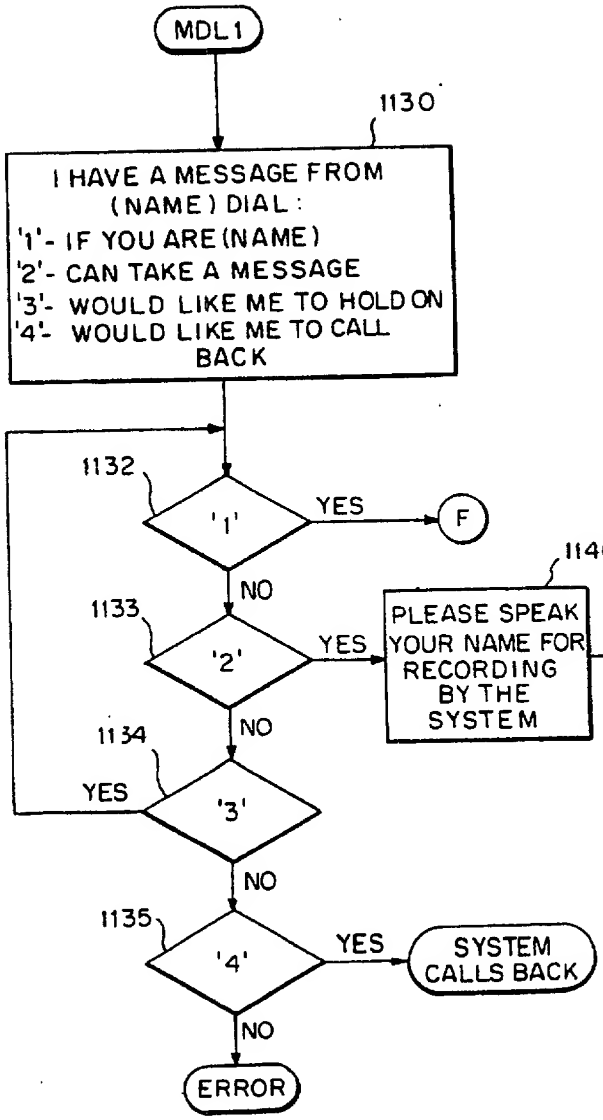


FIG. 12B

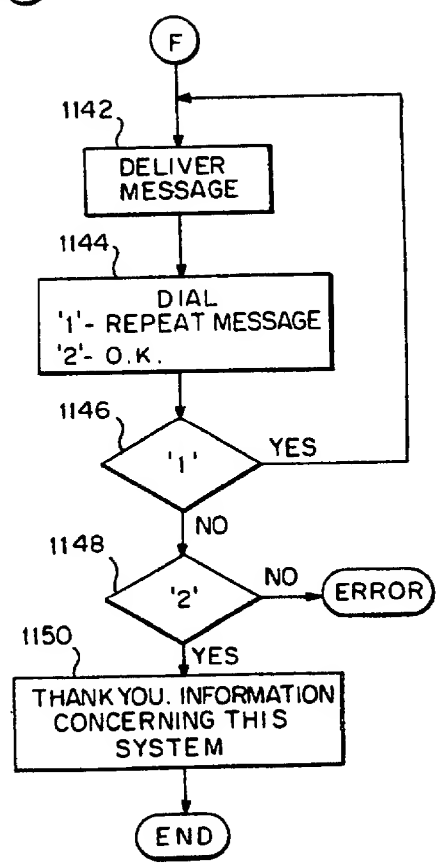


FIG. 13A

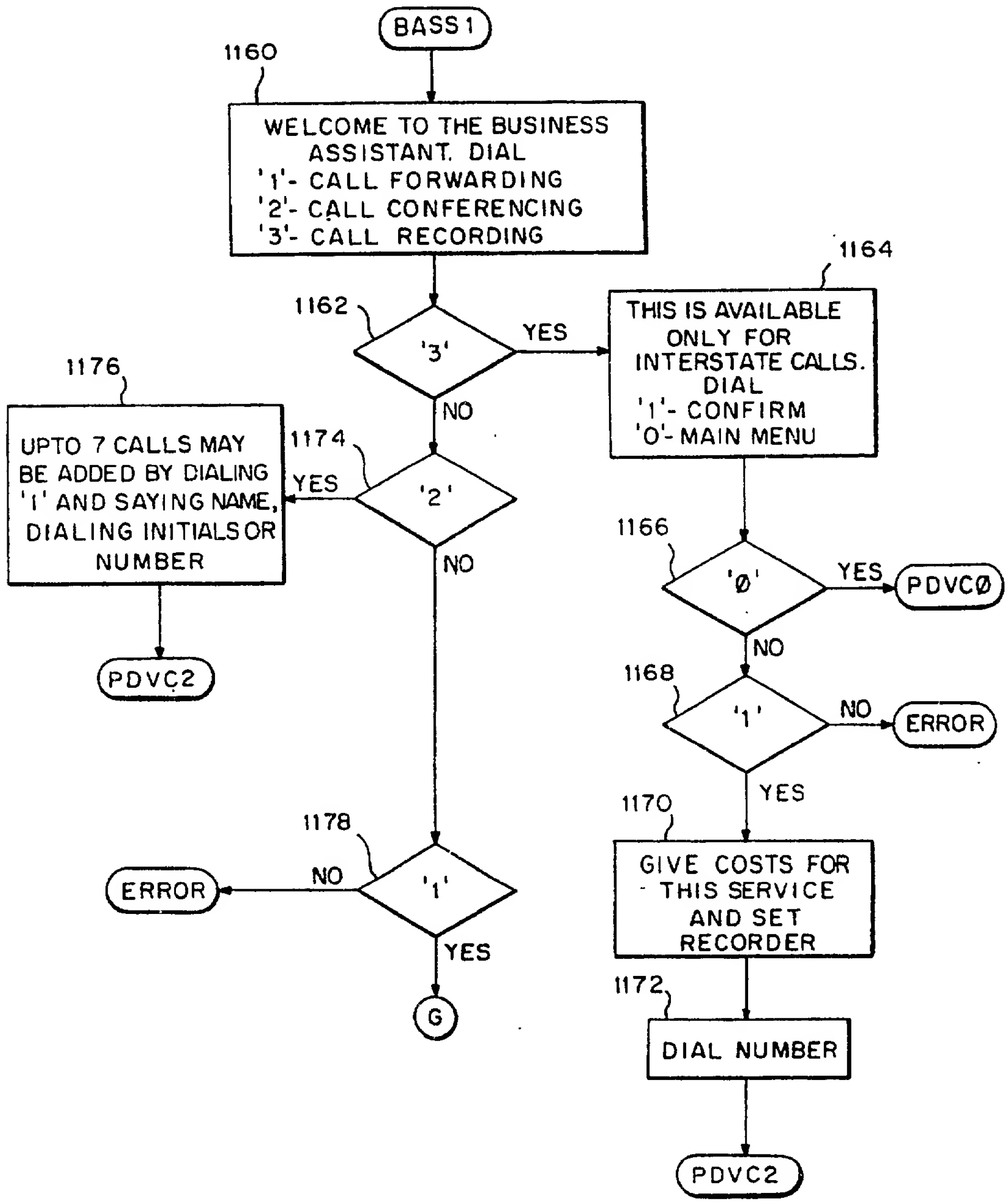

BASS 1
1160
WELCOME TO THE BUSINESS ASSISTANT. DIAL
'1'- CALL FORWARDING
'2'- CALL CONFERENCING
'3'- CALL RECORDING
1162
'3'
YES
NO
1164
THIS IS AVAILABLE ONLY FOR INTERSTATE CALLS. DIAL
'1'- CONFIRM
'0'- MAIN MENU
1176
UPTO 7 CALLS MAY BE ADDED BY DIALING '1' AND SAYING NAME, DIALING INITIALS OR NUMBER
1174
'2'
YES
NO
PDVC2
1166
'Ø'
YES
PDVCØ
NO
1168
'1'
NO
ERROR
YES
1170
GIVE COSTS FOR THIS SERVICE AND SET RECORDER
1172
DIAL NUMBER
PDVC2
1178
'1'
NO
ERROR
YES
G

FIG. 13B

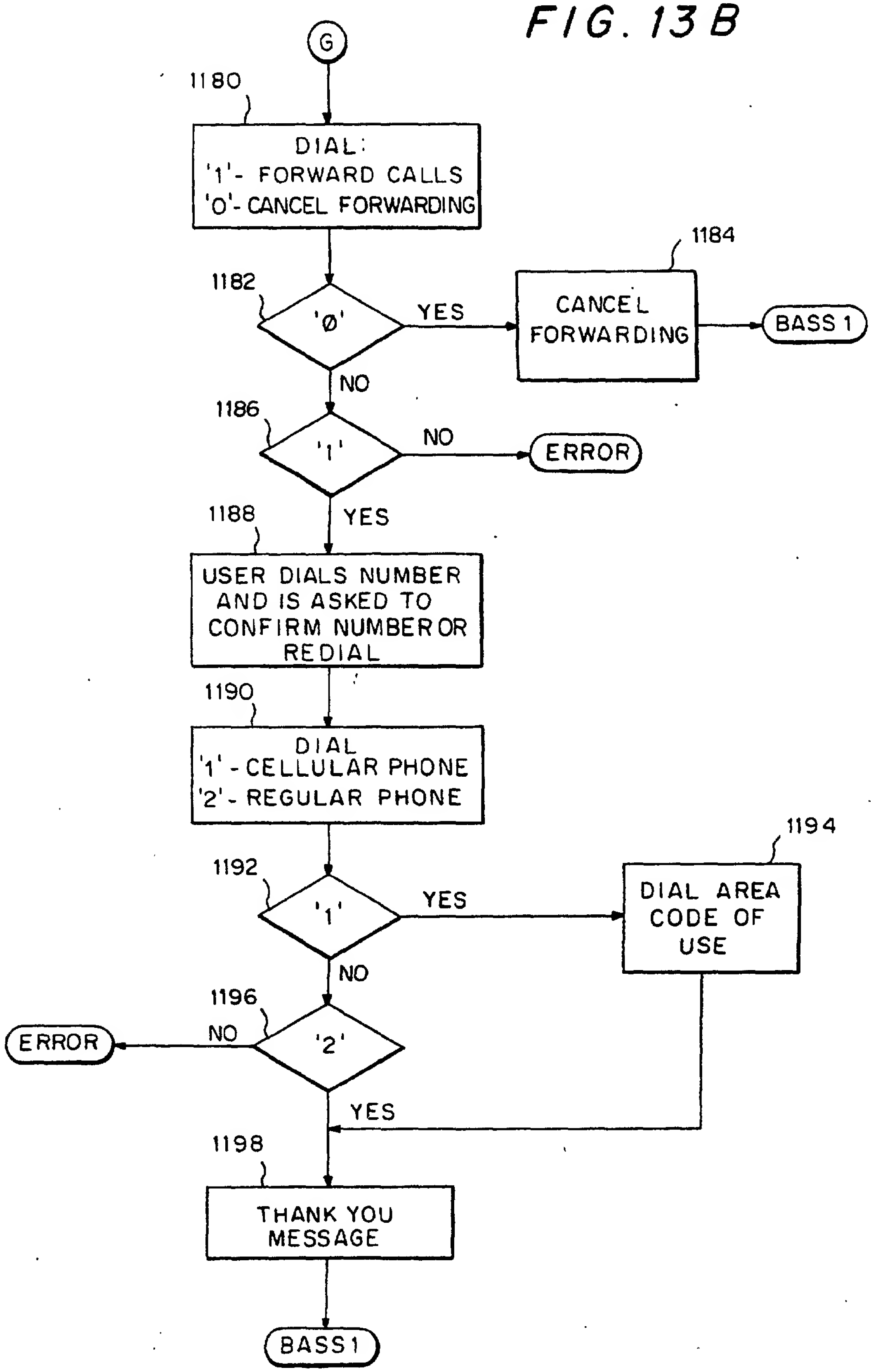

G
1180
DIAL:
'1'- FORWARD CALLS
'O'- CANCEL FORWARDING
1182
'Ø'
YES
1184
CANCEL FORWARDING
BASS 1
NO
1186
'1'
NO
ERROR
1188
YES
USER DIALS NUMBER AND IS ASKED TO CONFIRM NUMBER OR REDIAL
1190
DIAL
'1' - CELLULAR PHONE
'2' - REGULAR PHONE
1192
'1'
YES
1194
DIAL AREA CODE OF USE
NO
1196
'2'
NO
ERROR
YES
1198
THANK YOU MESSAGE
BASS1

FIG. 14

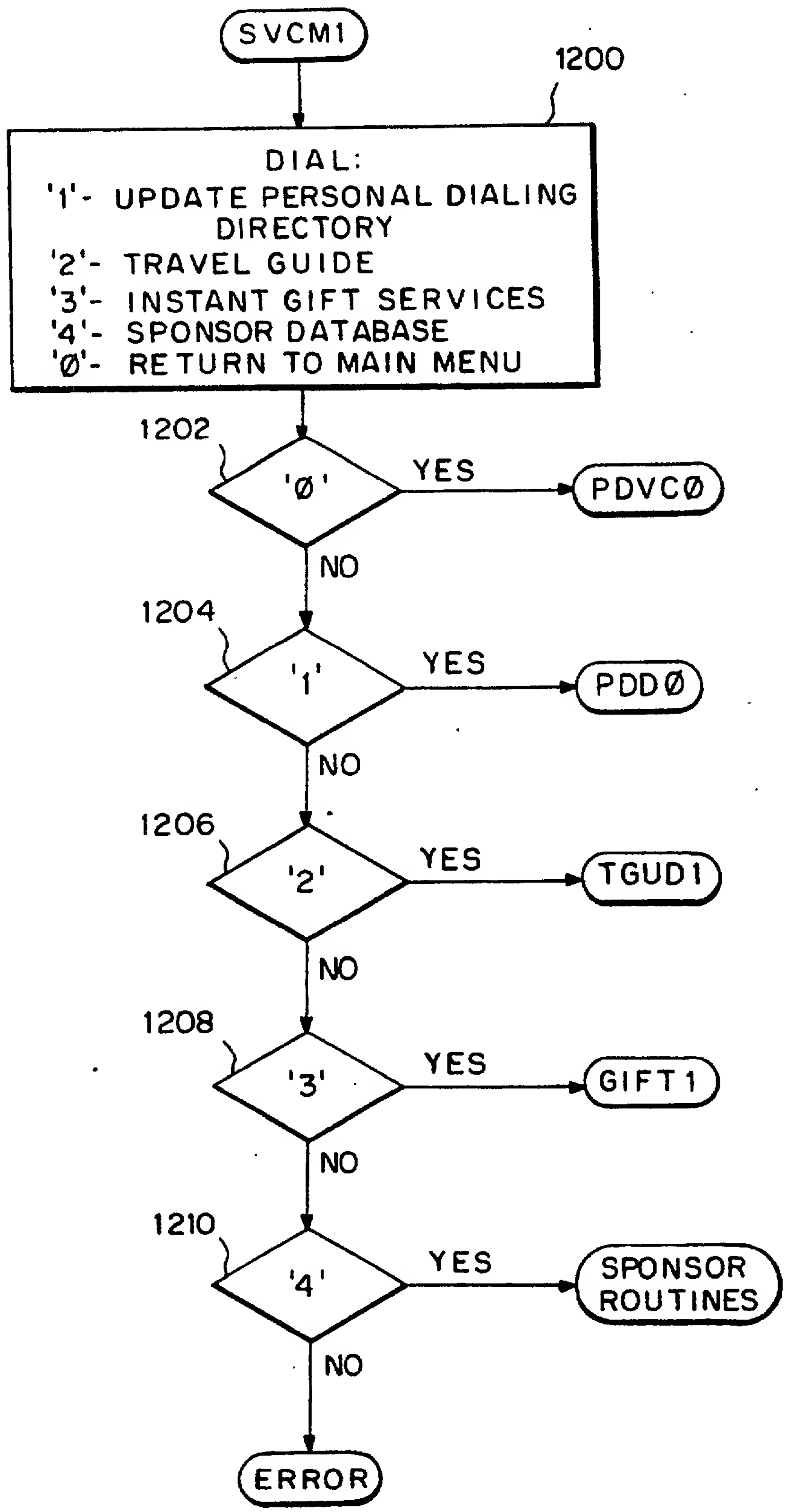

SVCM1
1200
DIAL:
'1'- UPDATE PERSONAL DIALING DIRECTORY
'2'- TRAVEL GUIDE
'3'- INSTANT GIFT SERVICES
'4'- SPONSOR DATABASE
'Ø'- RETURN TO MAIN MENU
1202
'Ø'
YES
PDVCØ
NO
1204
'1'
YES
PDDØ
NO
1206
'2'
YES
TGUD1
NO
1208
'3'
YES
GIFT1
NO
1210
'4'
YES
SPONSOR ROUTINES
NO
ERROR

FIG. 15

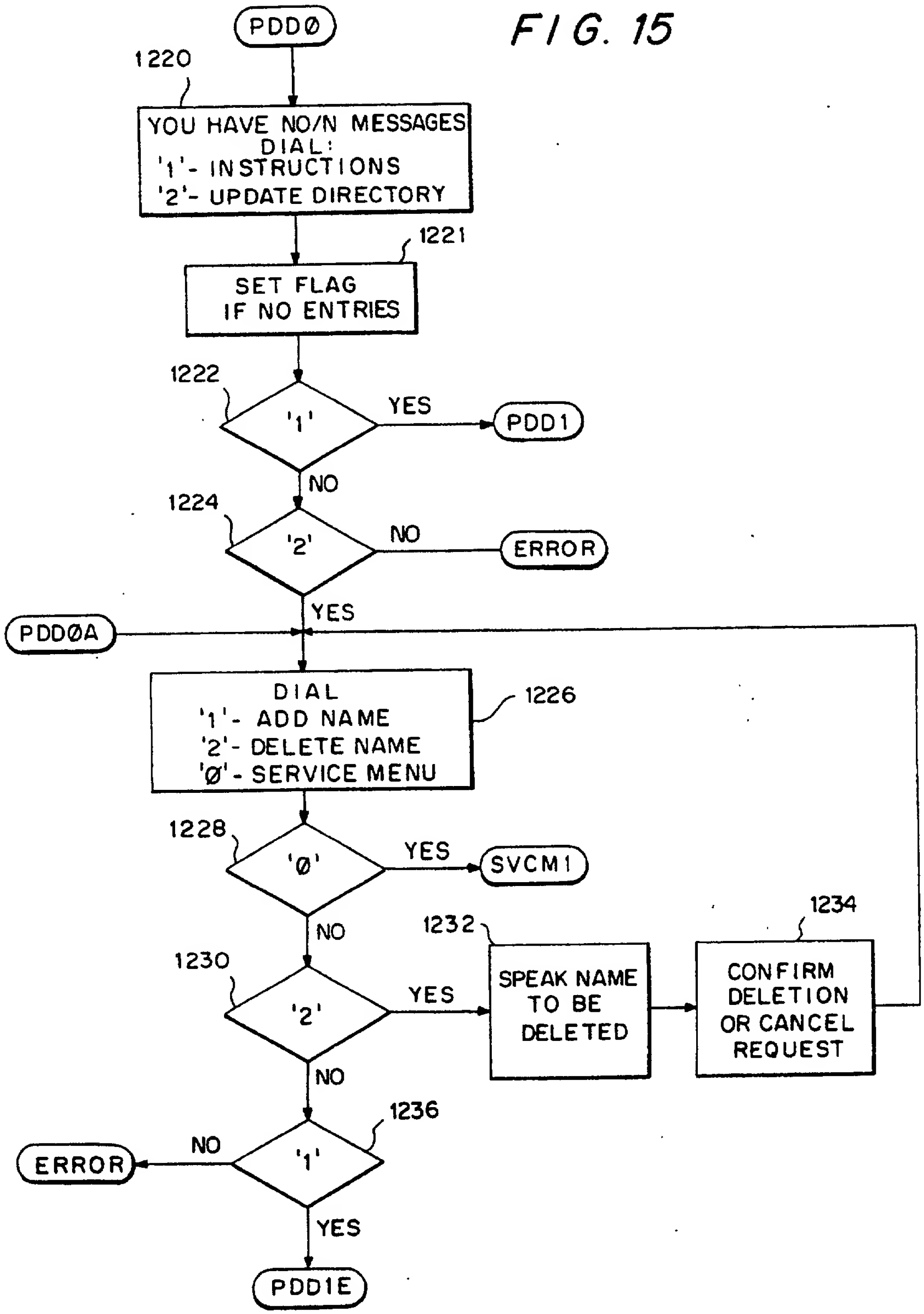

PDDØ
1220
YOU HAVE NO/N MESSAGES
DIAL:
'1'- INSTRUCTIONS
'2'- UPDATE DIRECTORY
1221
SET FLAG
IF NO ENTRIES
1222
'1'
YES
PDD1
NO
1224
'2'
NO
ERROR
YES
PDDØA
DIAL
'1'- ADD NAME
'2'- DELETE NAME
'Ø'- SERVICE MENU
1226
1228
'Ø'
YES
SVCM1
NO
1230
'2'
YES
1232
SPEAK NAME TO BE DELETED
1234
CONFIRM DELETION OR CANCEL REQUEST
NO
1236
'1'
NO
ERROR
YES
PDD1E

FIG.16A

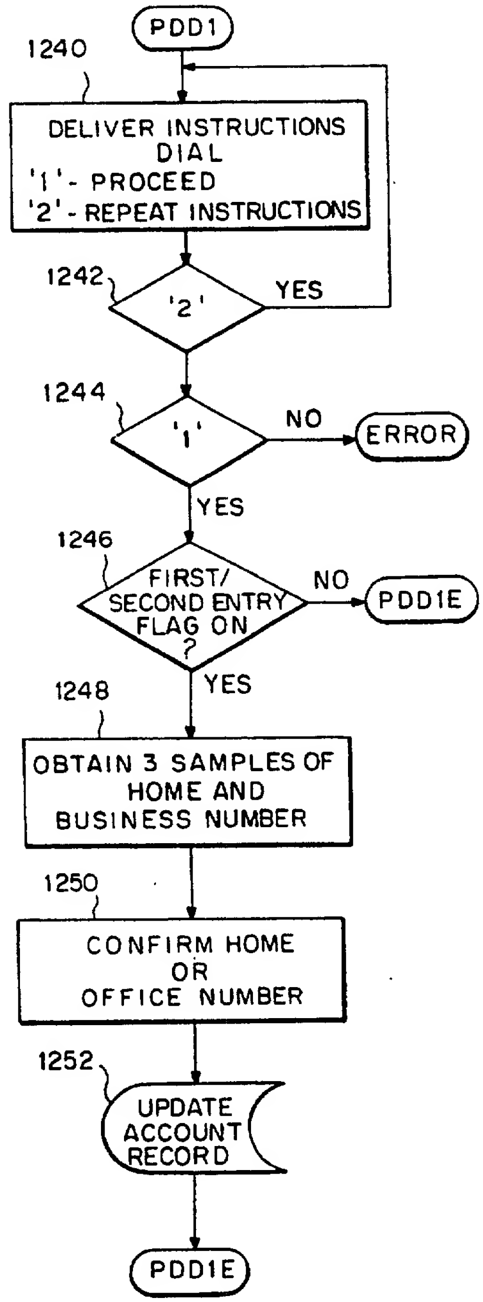


FIG.16B

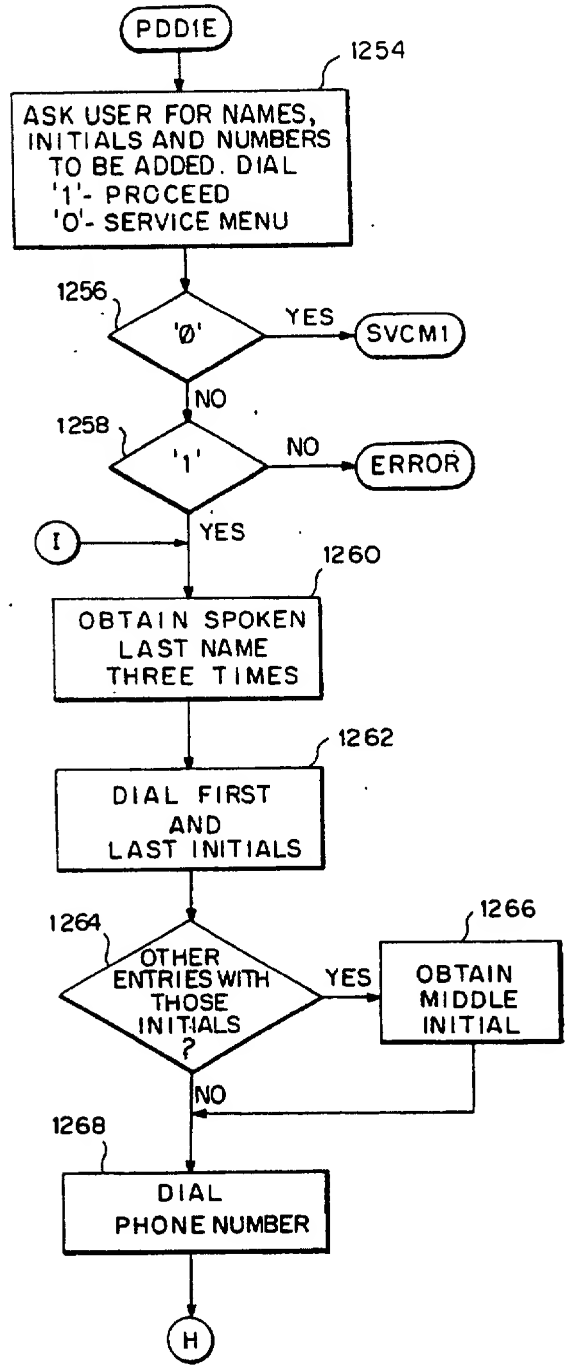


FIG. 16C

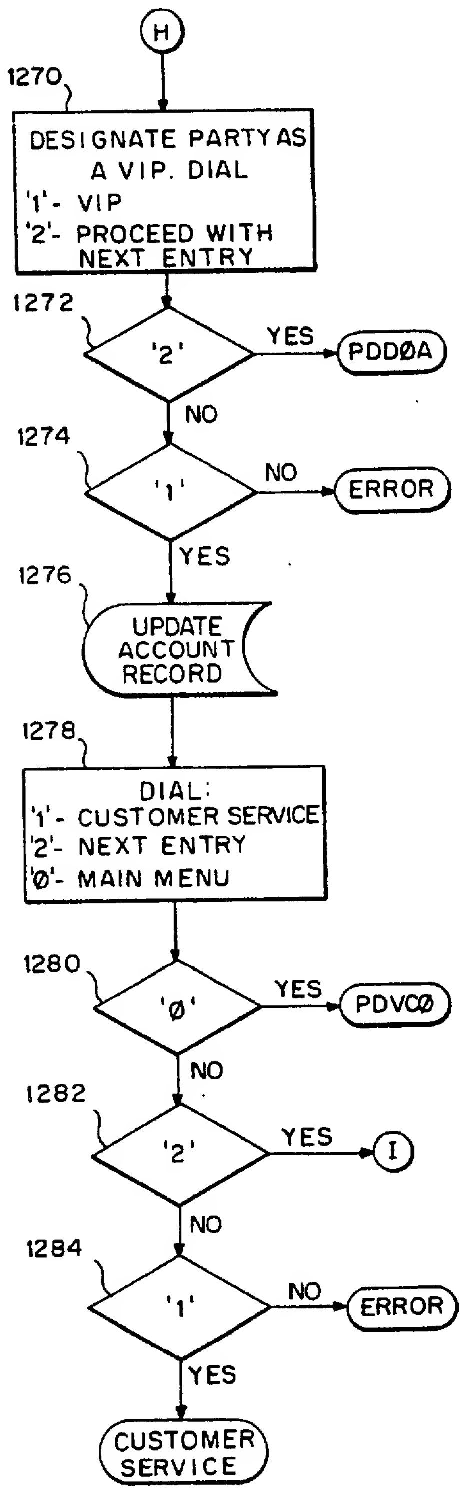


FIG. 17

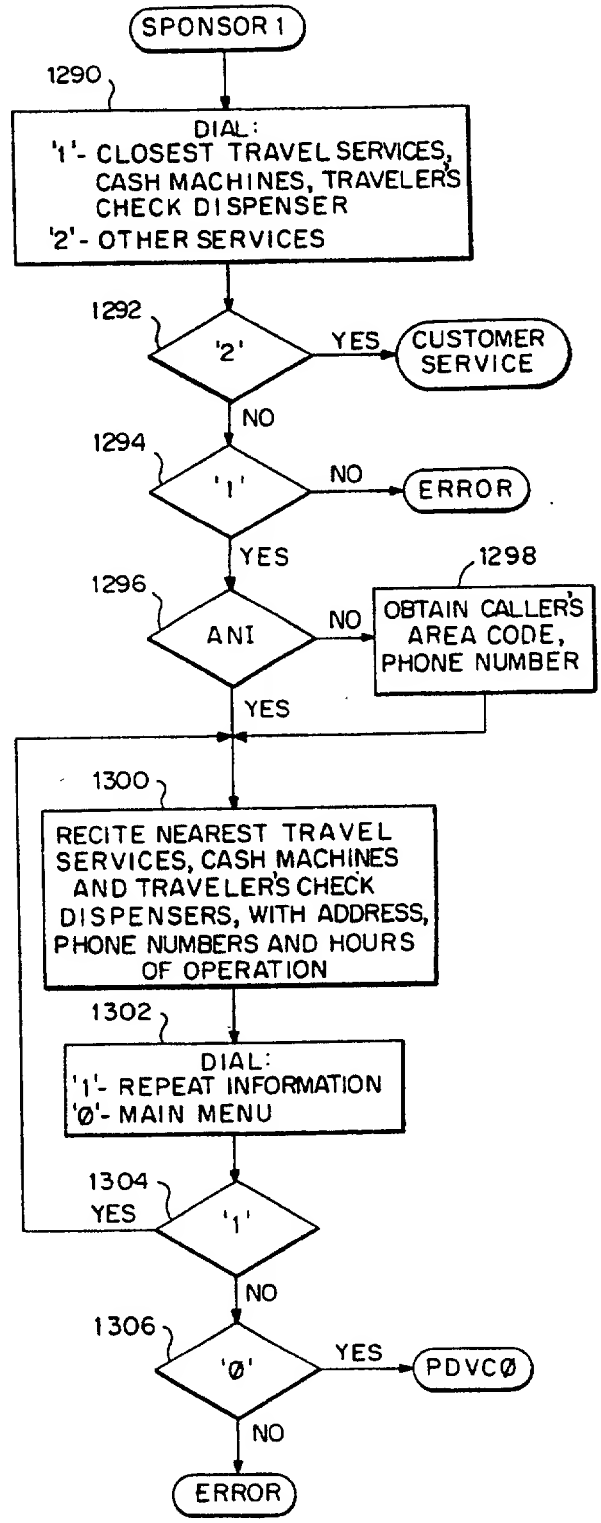


FIG. 18A

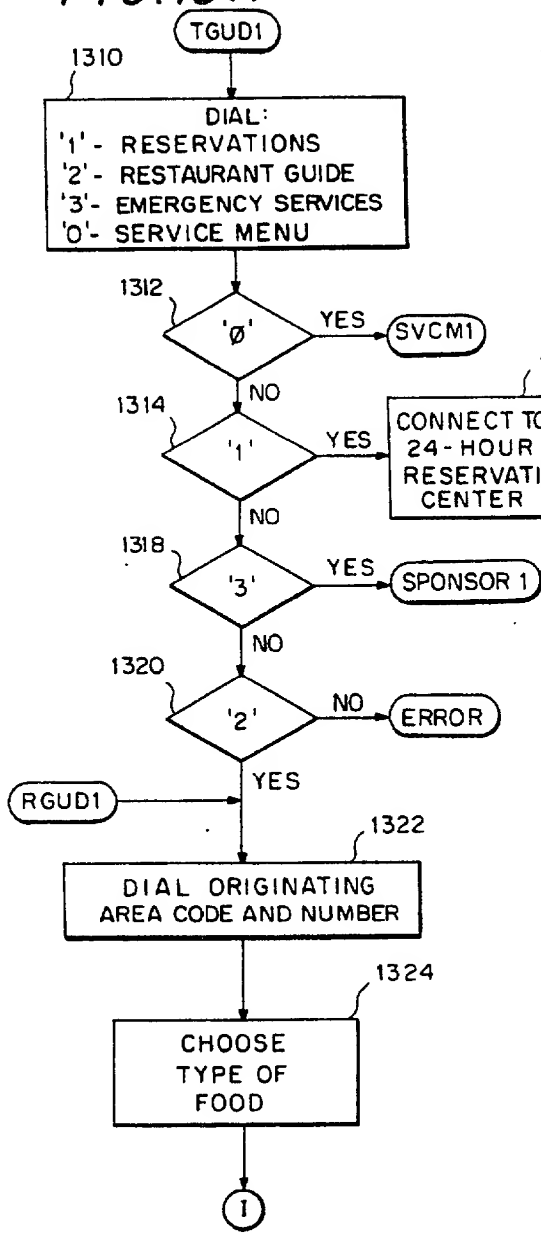


FIG. 18B

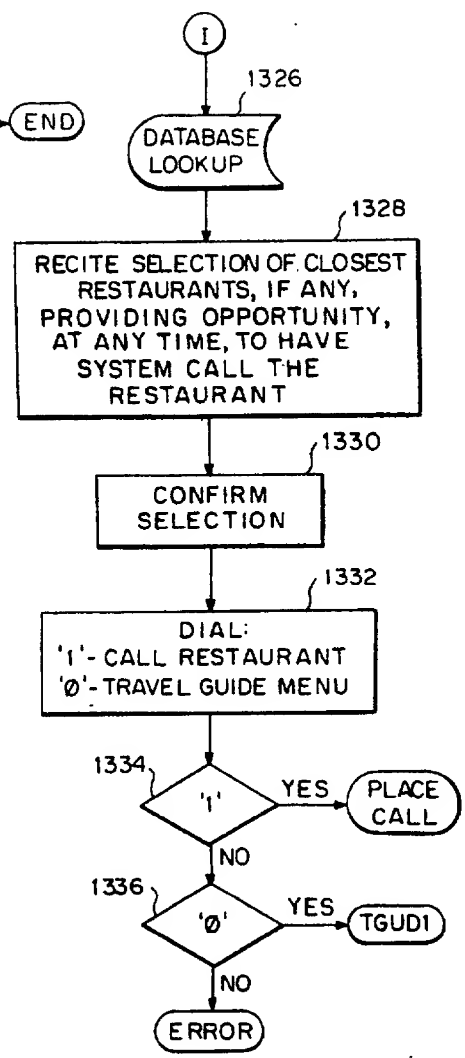


FIG. 19

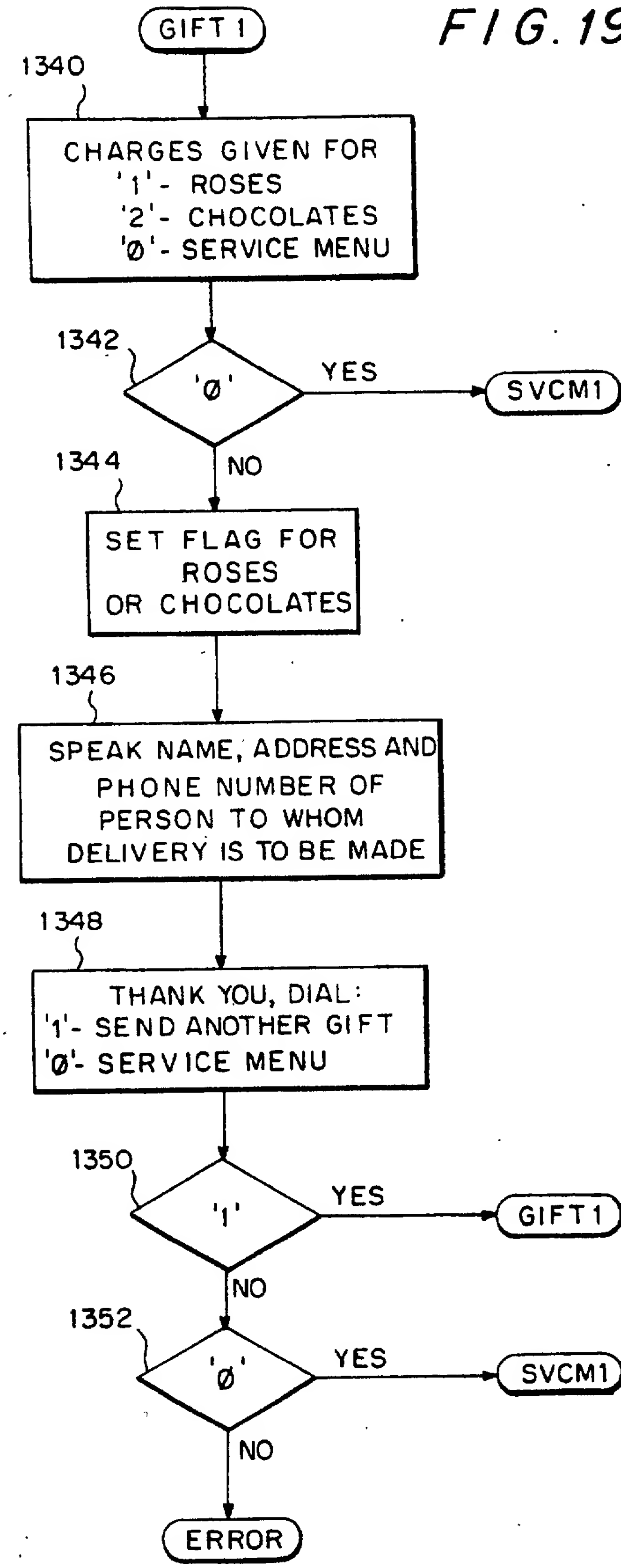

GIFT 1
1340
CHARGES GIVEN FOR
'1'- ROSES
'2'- CHOCOLATES
'Ø'- SERVICE MENU
1342
'Ø'
YES
SVCM1
NO
1344
SET FLAG FOR ROSES OR CHOCOLATES
1346
SPEAK NAME, ADDRESS AND PHONE NUMBER OF PERSON TO WHOM DELIVERY IS TO BE MADE
1348
THANK YOU, DIAL:
'1'- SEND ANOTHER GIFT
'Ø'- SERVICE MENU
1350
'1'
YES
GIFT1
NO
1352
'Ø'
YES
SVCM1
NO
ERROR

FIG. 20A

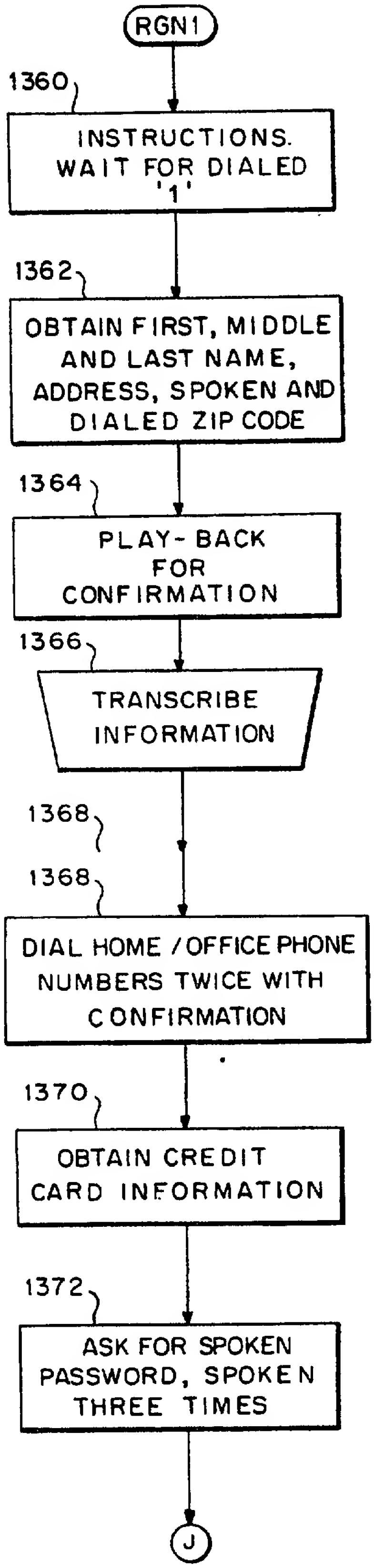


FIG. 20B

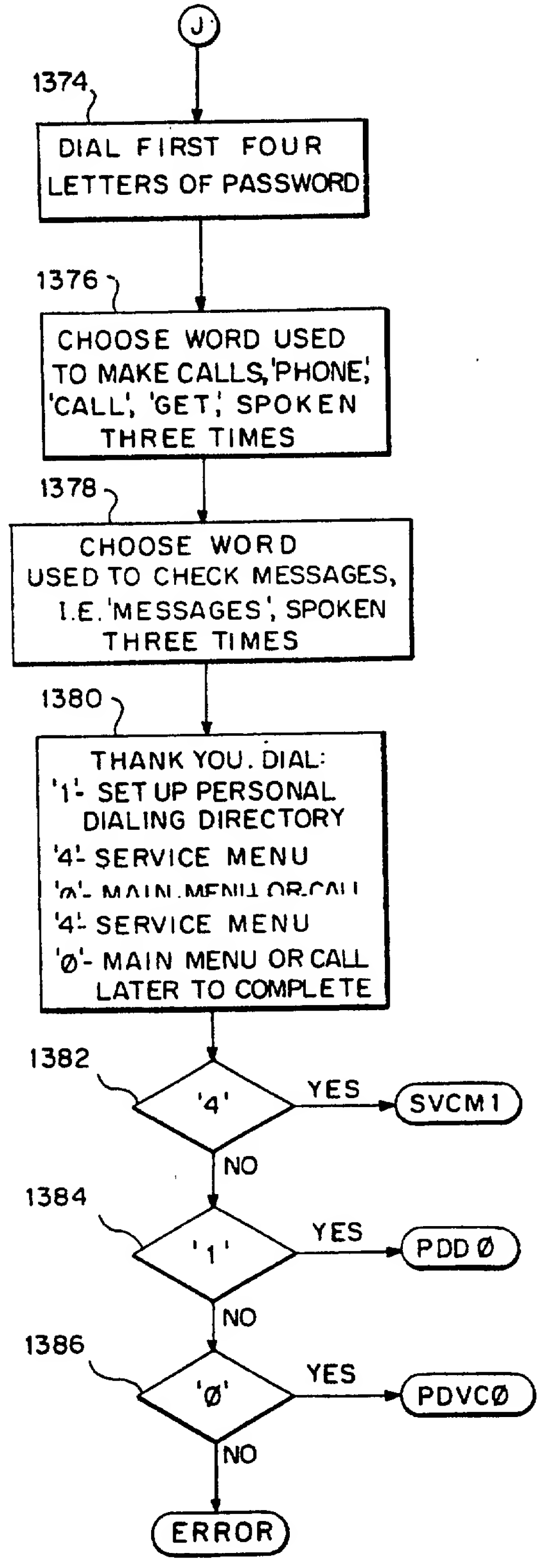


FIG. 21A

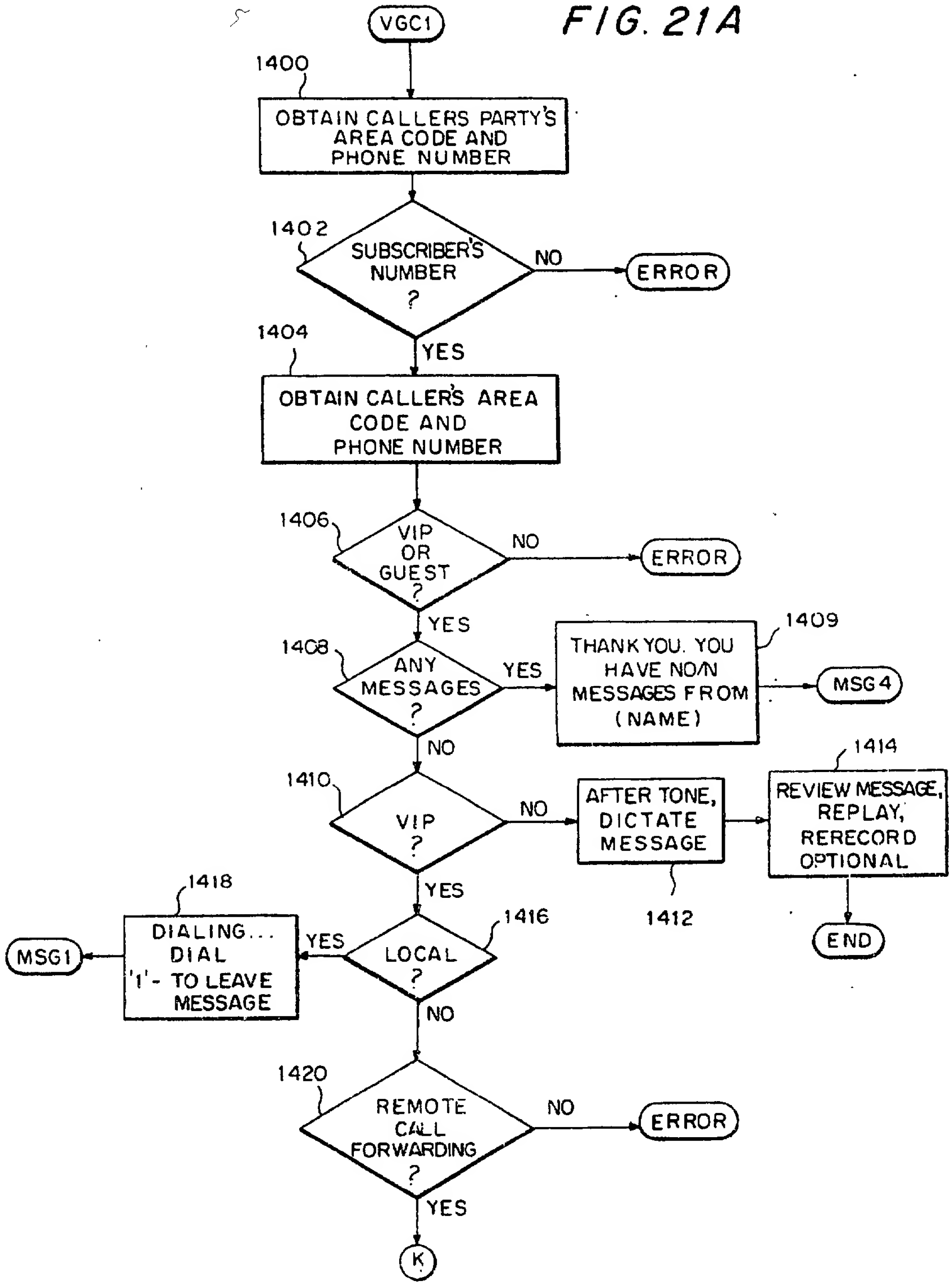
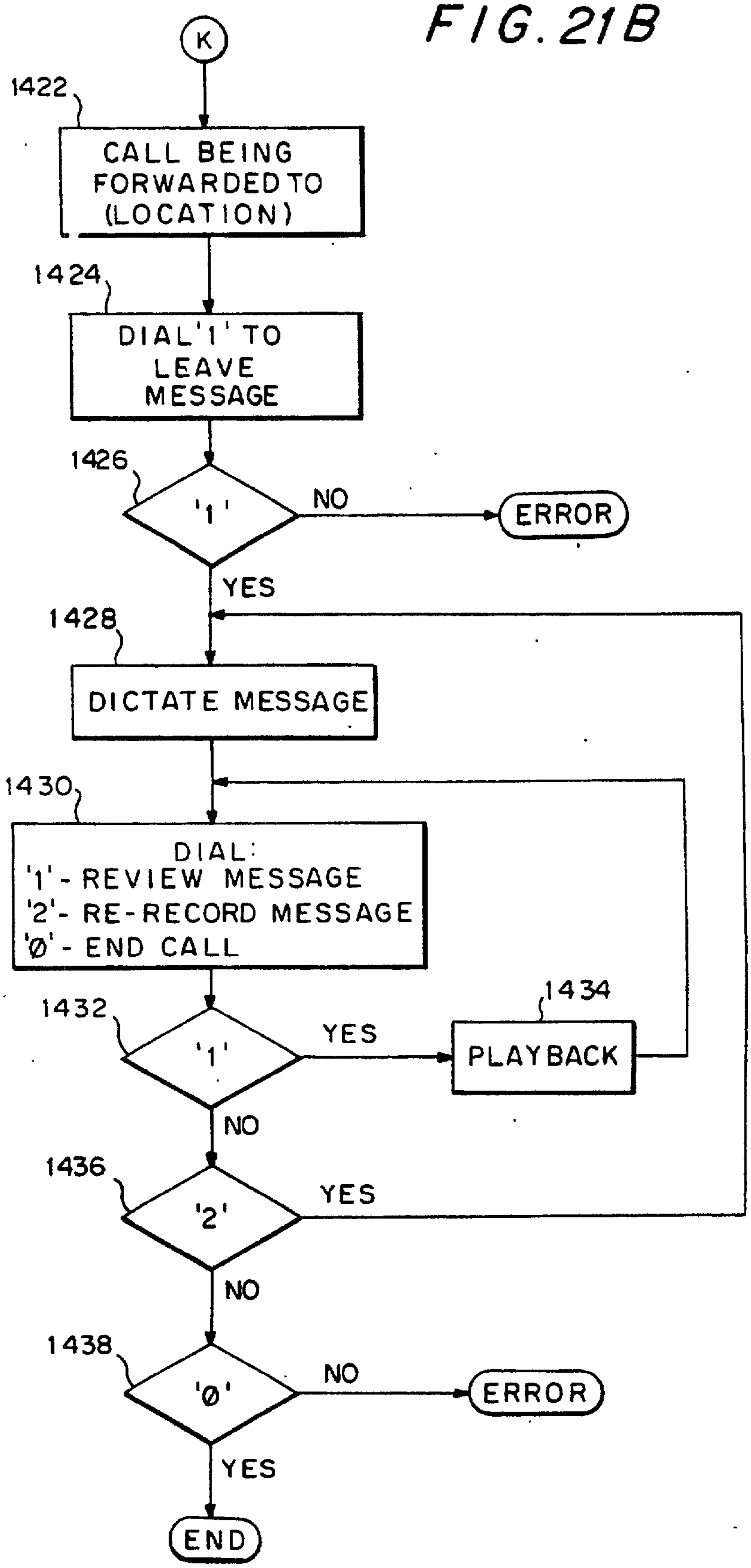

VGC1
1400
OBTAIN CALLERS PARTY'S AREA CODE AND PHONE NUMBER
1402
SUBSCRIBER'S NUMBER ?
NO
ERROR
YES
1404
OBTAIN CALLER'S AREA CODE AND PHONE NUMBER
1406
VIP OR GUEST ?
NO
ERROR
YES
1408
ANY MESSAGES ?
YES
THANK YOU. YOU HAVE NO/N MESSAGES FROM (NAME)
1409
MSG 4
NO
1410
VIP ?
NO
AFTER TONE, DICTATE MESSAGE
1412
REVIEW MESSAGE, REPLAY, RERECORD OPTIONAL
1414
END
YES
1416
LOCAL ?
YES
DIALING... DIAL '1'- TO LEAVE MESSAGE
1418
MSG1
NO
1420
REMOTE CALL FORWARDING ?
NO
ERROR
YES
K

FIG. 21B


K
1422
CALL BEING FORWARDED TO (LOCATION)
1424
DIAL '1' TO LEAVE MESSAGE
1426
'1'
NO
ERROR
YES
1428
DICTATE MESSAGE
1430
DIAL:
'1' - REVIEW MESSAGE
'2' - RE-RECORD MESSAGE
'Ø' - END CALL
1432
'1'
YES
1434
PLAYBACK
NO
1436
'2'
YES
NO
1438
'Ø'
NO
ERROR
YES
END

TELEPHONE COMMUNICATIONS SYSTEM INCLUDING A DIGITAL TELEPHONE SWITCH, A VOICE RESPONSE UNIT AND A STORED PROGRAM SEQUENCE FOR CONTROLLING BOTH THE SWITCH AND THE VOICE RESPONSE UNIT

This application is a continuation of application Ser. No. 07/639,739; filed Jan. 11, 1991, now abandoned, which was a continuation of application Ser. No. 147,102; filed Jan. 20, 1988, now abandoned.

A microfiche Appendix has been provided which lists the object code of the program which controls the telephone communications system according to the present invention. There is 1 microfiche, with 79 frames.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a telephone communications system which includes a digital telephone switch, a voice response unit and a central processing unit, the telephone switch and the voice response unit being controlled by a common program sequence stored in the central processing unit.

2. The Prior Art

In today's busy and mobile business world, approximately 75% c: the business calls initiated do not reach the intended party when they are first placed. This occurs because business persons are not generally available at any one place during the course of the business day. In addition, time zone differentials contribute to the likelihood of incomplete and missed calls. While personal secretaries are able to facilitate business communications for certain senior executives, in many cases, such support staff members are not cost justifiable even in large firms. In addition, the message notation provided by secretaries and answering services generally include brief written messages, but interactive conversation is not possible.

It is for this reason that electronic telephone-answering machines and voice mail systems are becoming more wide-spread since they can record and play back such messages. While both the answering services and messaging machines provide for the receipt of messages, they do not always work well because messages are often too long, too complex, or too personal for the caller either to record comfortably in a certain time period or to leave with a third party. Further, these systems provide only one-way messaging.

A number of systems exist which provide a partial solution to the problems encountered by mobile executives. In these systems, a PBX is connected to a voice response unit. The voice response unit acts as a slave device to the PBX, each separately controlled. The voice response unit sees the PBX as just another telephone line and the PBX sees the voice response unit as just another telephone port. However, as will be discussed below, none of these systems provide the comprehensive solutions offered by the system according to the present invention wherein the telephone switch and the voice response unit are controlled by a common stored program sequence.

U.S. Pat. No. 4,371,752 to Matthews et al. discloses a telecommunication voice mail system (VMS) which allows subscribers to leave verbal messages for automatic delivery to a number of third parties. In addition, users may call the system at anytime to determine whether messages have been deposited for them. In order to have the system address a message to a number of addressees, the user dials the VMS and identifies himself using a unique authorization code. After entering the addresses of the addressees to which the communication is to be delivered, consisting of the telephone number including area code, the user records the message for delivery. To deliver the messages, the VMS places the call to the message recipient. When the recipient answers, he is required to identify himself by an authorization number. If the message addressee has not answered or the telephone is busy, the VMS is programmed to call back a predetermined number of times at predetermined time intervals until contact has been made. Once the user has been identified by his authorization number, the VMS plays back the recorded message for that particular user. This patent is distinguishable from the present invention in a very important way: the patented system does not include a telephone switch connected to a voice response unit controlled by a common stored program sequence to provide the capabilities of allowing subscribers to place calls through the system and leave messages for the addressee only when the call goes unanswered or the line the busy. The VMS also lacks numerous other features provided by the system according to the present invention.

U.S. Pat. No. 4,580,012 to Matthews et al. is a continuation-in-part application of U.S. Pat. No. 4,371,752. The '012 system includes a variety of additional features, for example, a priority hold feature, which allows the user to place the VMS in a mode whereby a priority message can be automatically relayed to the telephone of the user. This is again different from the present application in which an actual call from a VIP is routed directly to the telephone number which the subscriber has left. This system, like its parent, does not include a voice recognition system, nor does it allow subscribers to leave a message in response to an uncompleted telephone call.

U.S. Pat. Nos. 4,652,700, 4,581,486, 4,585,906, 4,602,129 and 4,640,991, all to Matthews et al. are all continuation-in-part applications of the application which resulted in U.S. Pat. No. 4,371,752. Each of the patents relates to various features of the originally described voice messaging system. As discussed above, none of the patents disclose a method and means by which a subscriber can make use of a variety of telephone services including leaving recorded messages for later playback when a dialed party is not available and a voice recognition system allowing the user or the subscriber to verbally participate in selecting the various features of the system, as is available according to the present invention.

The remaining patents and systems are only peripherally related to the present invention.

U.S. Pat. No. 4,646,346 to Emerson et al. discloses an integrated message service system which is essentially a voice mail system, allowing the user to record a message for later access and playback. The telephone

switching system that serves the subscriber provides a number of message services (mail, message center, etc.) and integrates the control of these services so that the subscriber is provided with a single indication of the location of all messages awaiting retrieval on all message service systems. The system is passive in that a voice message is recorded and placed in a mailbox assigned to each identified recipient, awaiting the later call back of the recipient, without the capability of actively calling the recipient to playback the message.

U.S. Pat. No. 4,054,756 to Comella et al. discloses a system for serving special service telephone calls on a wholly automatic basis without operator intervention. These special service calls includes calls such as collect, person-to-person and charged-third party calls. The system controls the type of call made by asking the calling party to dial a digit corresponding to the particular type of call desired.

U.S. Pat. No. 4,577,062 to Hilleary et al. discloses a system which is capable of accumulating data which is constantly changing and passing this information to already existing telephone equipment. The information includes things such as weather reports, airline information and stock and security prices. The users may be required to transmit some form of identification signal to the system to identify the caller as being a member of a directory such as subscribers of a particular information service. This identification signal would be dialed into a telephone set.

U.S. Pat. No. 4,556,761 to Hashimoto discloses an automatic telephone answering machine which uses a speech synthesizer to deliver the messages to the caller and records the caller's voice on an external tape recorder.

U.S. Pat. No. 4,625,081 to Lotito et al. discloses an automated telephone voice service system which provides automatic recording and editing of voice messages as well as forwarding of recorded voice messages to other accounts and telephone numbers with or without operator assistance. This is basically a voice mail system.

U.S. Pat. No. 4,528,658 to Israel discloses a telephone switching exchange wherein a multiplicity of modular units exchange digital messages in a synchronous manner by way of full-duplex signalling paths.

U.S. Pat. No. 4,580,016 to Williamson discloses a method and system for determining the quality of the communication channel between two or more voice store and forward systems prior to the transmission of messages between the two systems over the communication channel in question.

U.S. Pat. No. 4,589,107 to Mittleton et al. discloses a system whereby PCM speech transmission data are utilized to contain both digitized speech, for example, from a telephone and other data, for example, from a data terminal, in the same channel within a frame having a plurality of channels. This allows the speech and data to be combined in a common information field and simultaneously transmitted in the same channel through a digital switching network to other system users.

U.S. Pat. No. 4,440,986 to Thorson discloses a microprocessor controller used to control a PBX for efficiently providing access to general data processing functions. This system merely allows a number of users to access the same data processing system through the PBX.

U.S. Pat. No. 3,302,182 to Lynch et al. discloses a modular system for processing, storing and forwarding messages. Individual or group messages may be processed through the system. This system provides a secure message switching center implemented using a totally modular data processor. Messages which are passed through the system may be clear or cryptographic messages passed via a digital data processor. In other words, this message system does not relate to telephone communication but instead controls messages transmitted between teletype systems.

AT&T markets a system called "CALL EXPRESS". This system is merely a voice mail system which does not include any telephone switching capabilities or voice recognition capabilities.

Cellular, or mobile telephones are also used increasingly as an alternative or supplement to answering services and messaging machines. Used by many business executives, cellular telephones, some of which are portable, allow immediate access to make and receive telephone calls. Some models accept call forwarding, the automatic transfer of an incoming call from one number and location to another telephone. However, when the user finds answering inconvenient, generally, the call cannot be automatically routed to another location.

As mentioned above, conventionally, voice response units have been used as self-contained, slave devices connected to a PBX, the PBX including a CPU. The PBX treats the voice response unit as if it were just another telephone port, or more specifically, an operator revert station. Likewise, the voice response unit treats the PBX as if it were just another telephone line. In these prior art systems, the PBX and the voice response unit are each controlled individually by their own microprocessor or stored control sequence. In contrast, the present invention provides a system by which the voice response unit and the telephone switch are orchestrated by a common stored program sequence to provide enhanced communications functions, such as voice activated control of telephone switching and two-way voice messaging.

SUMMARY OF THE INVENTION

The following provides a narrative summary of the features available through the software designed according to the present invention. A user dials an "800", foreign exchange, or local number, identifies himself as a subscriber, and selects a speed dialing code, possibly with reference to the name or dialed initials representing the person to be called. At any time, the user may make another call without identifying himself again. A voice message may be left in the event of an unanswered call. The user can either instruct the telephone communications system to dial the number until it gets through and deliver the message or to place the message in storage for the called party to retrieve at a later time.

Subscribers may provide courtesy calling privileges for certain people, such as call forwarding for a VIP which allows the VIP's call to be directly routed to the place where the subscriber is currently located, as well as recording messages from guests who are trying to reach the subscriber and are unable to do so. Additionally the subscriber may access travel related information, such as local restaurants, nearest local ATM locations and weather information. If he so desires, the subscriber who is accessing the local restaurant guide can be connected directly by telephone to the restaurant. At any time during a call, the subscriber may access the call conferencing or call recording features.

It is an object of the present invention to provide a telecommunication system in which a voice response unit and a telephone switch are controlled by a common stored program sequence.

It is a further object of the present invention to provide a telecommunication system which includes a digital telephone switch and a voice response unit both controlled by a stored program sequence stored within, and executed by, a central processing unit within, or without, the voice response unit.

It is a further object of the present invention to offer busy professionals and corporate executives an advanced personal communication system with 24-hour accessibility.

It is a further object of this invention to provide a two-way messaging service whereby a subscriber can have a message delivered to either another subscriber or a non-subscriber and conversely, a non-subscriber can leave a message for a subscriber.

It is a further object of this invention to provide a system which combines features such as automatic voice messaging, remote call forwarding, and an integrated personal dialing directory.

It is a further object of this invention to allow non-subscribers to receive messages from subscribers, and to leave vocal replies if the non-subscriber so desires.

It is a further object of this invention to provide touch-tone responses and speaker-dependent voice recognition capabilities to interpret commands delivered by subscribers to control both the voice response unit and the digital telephone switch.

In a preferred embodiment, the present invention relates to a telephone communication node comprising a telephone switch having a plurality of incoming and outgoing lines for switching calls therebetween, an audio voice response unit for receiving first audio communications and for generating and transmitting second audio communications, and control means for executing a stored program sequence based upon the first audio communications received by the audio response unit to control both the audio response unit and the telephone switch.

The method of operating the telephone communications system according to the present invention comprises the steps of producing computer-generated audio messages according to a stored user script, accepting audio user commands from users in response to the computer-generated messages, processing the accepted commands, and controlling a telephone switch and an audio response unit responsive to the processed commands.

Still other objects, features and attendant advantages of the present invention will become apparent to those skilled in the art from a reading of the following detailed description of the embodiments constructed in accordance therewith, taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention of the present application will now be described in more detail with reference to the preferred embodience to the accompanying drawings, in which:

FIG. 1 is a block diagram of the entire communications system according to the present invention;

FIG. 2A is a block diagram of the regional network nodes shown in FIG. 1 according to the present invention;

FIG. 2B is a block diagram of the local network nodes shown in FIG. 1 according to the present invention;

FIG. 2C is an alternative embodiment of the regional network nodes;

FIG. 3 is a block diagram of the main menu routine of the stored program sequence according to the present invention;

FIG. 4 is a block diagram of the subscriber registration routine of the stored program sequence according to the present invention;

FIG. 5 is a block diagram of the message retrieval routine of the stored program sequence according to the present invention;

FIG. 6 is a block diagram of the VIP/Guest call-in routine of the stored program sequence according to the present invention;

FIG. 7 is a block diagram of the sponsor emergency services routine of the stored program sequence according to the present invention;

FIG. 8A is a flowchart of the subscriber identification routine of the stored program sequence according to the present invention;

FIG. 8B is a flowchart of the main menu routine of the stored program sequence according to the present invention;

FIGS. 9A and 9B are flowcharts of the routine entered to place a telephone call in the stored program sequence according to the present invention;

FIGS. 10A and 10B are flowcharts of the messaging routine of the stored program sequence according to the present invention;

FIGS. 11A, 11B, and 11C are flowcharts of the message retrieval routine of the stored program sequence according to the present invention;

FIGS. 12A and 12B are flowcharts of the message delivery routine of the stored program sequence according to the present invention;

FIGS. 13A and 13B are flowcharts of the business assistant routine of the stored program sequence according to the present invention;

FIG. 14 is a flowchart of the service menu routine of the stored program sequence according to the present invention;

FIG. 15 is a flowchart of the routine to update the personal dialing directory in the stored program sequence according to the present invention;

FIGS. 16A, 16B and 16C are flowcharts of the routine to create the personal dialing directory in the stored program sequence according to the present invention;

FIG. 17 is a flowchart of the sponsor emergency services routine of the stored program sequence according to the present invention;

FIGS. 18A and 18B are flowcharts of the travel guide routine of the stored program sequence according to the present invention;

FIG. 19 is a flowchart of the instant gift service routine of the stored program sequence according to the present invention;

FIGS. 20A and 20B are flowcharts of the new subscriber entry routine of the stored program sequence according to the present invention; and

FIGS. 21A and 21B are flowcharts of the VIP/Guest message retrieval and deposit routine of the stored program sequence according to the present invention.

GENERAL DESCRIPTION OF THE PREFERRED EMBODIMENTS

The system which is the subject of the present invention is a telephone communications system (hereinafter referred to as the System) which provides a large number of capabilities to subscribers, as well as to non-subscribers. In a preferred embodiment, users are connected to the regional network node located in their office and/or home calling area by dialing one of a number of "800" (INWATS), foreign exchange or local telephone numbers from any location in the world using a touch-tone telephone.

Whether or not the caller is a subscriber is determined by the number on which he called. His subscriber status determines which scripts the System will recite and which routines he can access.

If the user is a subscriber, a voice response unit, or VRU, answers the call with a pre-recorded voice message, and requests that he identify himself by dialing his account number. The account number will be his telephone number. The user will then be asked to speak a password which will allow the System to positively identify the person as a subscriber. The System accesses its database of stored account numbers and passwords and compares the received account number and password to the stored values to determine whether there is a match to thereby identify the user as a subscriber.

The System will continue to initiate and respond with a menu of personalized and generic pre-recorded messages which are activated by the subscriber's spoken or dialed commands. Should assistance be required, the caller may dial a single digit and be connected to a System customer service operator.

If the user is not a subscriber, but is determined to be a user who wishes to sign up to become a subscriber, his call is switched to the routine used to enroll new subscribers.

While connected to the System, the subscriber may place a series of calls within the areas serviced by his network on local access telephone lines, as well as long distance calls which are switched through OUTWATS lines. Prompted by the subscriber's verbal instructions, the System will automatically dial the telephone number of any frequently called party (clients, business associates, and/or family members) which has been stored in a speed code dialing directory. Alternatively, the subscriber may directly dial any local or long distance number.

In the event a call is not answered or the line is busy, the subscriber will be able to record a message which the called party may retrieve later. The System may be instructed to automatically continue to dial the called party's number until reaching the party to deliver the subscriber's message. Alternatively, the System may be instructed to store the message for later retrieval. The third parties can be provided with "guest calling" privileges by the subscriber, entitling them to call the System to leave or retrieve messages from a subscriber 24 hours a day. In addition, certain parties listed in the directory may be designated as a "VIP" which entitles them to a greater level of System service. For example, the System may be instructed to recognize a subscriber's VIP callers and automatically forward a VIP's incoming call to any forwarding number the subscriber has left with the System.

As a supplement to the speed dialing directory, the System will offer an informational database which provides travel-related information. If automatic number identification service (ANI) is available from the long distance carrier, it pinpoints the location of the subscriber's call regardless of its point of origin. After the point of origin is determined, either by ANI or by input from the subscriber, the database identifies, and the System voice recites, the location specific information, such as the nearest traveller's check dispenser, automatic teller machines, or sponsor's offices. In addition, the database would include certain important information including emergency telephone numbers, flight schedule information, and destination city weather. In addition, the database would include information for providing reservations and a restaurant guide, and provide the capability of obtaining instant gift services such as sending candy or flowers.

The System will be marketed to potential subscribers individually and through one or more marketing partners or sponsors. These sponsors may be organizations such as credit card companies, frequent flyer programs, or travel groups, through which the System services will be offered to subscribers. The database which stores the additional information may be a generic one which is created by the manufacturers of the System. Additionally, the database may be provided by the sponsors of the System. In this case, the subscriber who enrolled in the System would have access to the database produced by the particular sponsor through which he enrolled.

The System is a voice controlled telephone switching and messaging system including close integration of a digital telephone switch and a digital voice response system controlled by a common stored program sequence stored in and executed by a common central processing unit (CPU). The present invention provides voice and telephone keypad control of switching functions and voice messaging. The system provides voice recognition for controlling telephone switching, placing of multiple outgoing calls with one incoming call, automatic initiating and prompting for voice messaging in the case of incomplete calls, and incoming call authorization and routing to subscriber locations.

The System uses a programmable voice response computer with integrated digital signal processing, including speaker dependent voice recognition, text-to-speech capabilities, and touch-tone recognition capabilities, which controls a fully digital "any-to-any" digital circuit switching matrix.

The present system is a computerized-response telephone service with multiple service and message recording transmission features. A convenience service, it offers busy individuals an advanced communication system with 24-hour accessibility. Messages recorded in the user's voice may be confidentially exchanged between subscribers and other subscribers, their key clients, business associates and family members.

The System uses existing long distance telephone lines owned and operated by local telephone companies.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The System is designed to integrate a telephone switching system (telephone switching matrix) with a voice or audio response unit (VRU) and orchestrate the functions of these two main equipment components through common proprietary, highly complex software applications programs, which are described hereinbe-

low. The software controls the sequence of events that occur every time the System is accessed.

All subscriber originated calls placed to the System over INWATS carrier lines will be received by the telephone switching matrix and automatically switched to the VRU which prompts the user concerning the availability of various messaging or database functions. The particular messages delivered to the user depend upon the particular INWATS or other telephone line on which the call was received. Based on the responses made by the user, the System instructs the telephone switching matrix to place an outbound call on OUTWATS or local access lines.

The System's design will be replicated in the series of regional network nodes to be located in major cities throughout the United States. This network system is shown in the block diagram of FIG. 1.

NCS 10 is the network control system. This system includes software which monitors the functioning of the network nodes. Regional network nodes RNN_1 through RNN_n, shown as elements 12, are connected to NCS 10 via high-speed (56 KPBS) switched data circuits 19 leased from a public data network carrier such as TELENET or TYMNET. The circuits will provide the NCS 10 with call usage statistics for billing information from the network nodes, as well as the capability to affect voice file and software updates from a single location. In addition, NCS 10 will support customer service representative terminals as well as being available for general corporate uses.

Each RNN 12 is connected to a number of local network nodes 14 via optical fiber transmission lines 11. The regional network nodes 12 will be placed in the largest United States cities and connected to the local network nodes 14 which will be installed in the smaller cities throughout the country.

The configuration of each of the regional network nodes 12 is shown in FIG. 2A. Each regional network node site configuration will include a telephone switching matrix 22 connected to an audio response unit or VRU 24 and the software according to the present invention which is programmed into a central processing unit 13. CPU 13 may be connected within VRU 24 as shown in FIG. 2A, or connected externally thereto as shown in FIG. 2C. Based upon the amount of traffic passing through a given RNN 12, two or more VRUs 24 and telephone switching matrices 22 may be connected to one another over a local-area network 20.

The telephone switching matrix 22, in previous systems, was typically connected to a dedicated embedded CPU for driving the switch. In the present device, a standard RS232 cable is used to connect the general purpose data ports on the telephone switching matrix 22 to the VRU 24. Thus, it is the VRU which drives the digital switch and not a dedicated CPU.

Incoming calls enter the regional network node 12 through a number of "800" INWATS trunk lines 17. Outgoing calls are processed through the LD "800" OUTWATS trunk lines 16. Two-way access is also available through local exchange trunk lines 15. Trunk access is provided at the T1 level, that is, a digital circuit with twenty-four simultaneous voice channels, which operate at 1.554 million bits per second. The lines to the local exchange are also provided at the two T1 level.

Digital signal processors 23 interface between the telephone switching matrix 22 and the VRU 24 over voice response ports 27. Switch control 21 controls the switching matrix 23 and provides an interface directly to VRU 24 through switch control and monitor lines 25.

Because the interconnections between the various components are regional, the quality of transmission is less subject to external interference. The minimum network node will be configured with sufficient INWATS, OUTWATS, long-distance, local and port/trunk terminations to accept and process at least twenty-four simultaneous phone calls. The regional network nodes 12 can be expanded as required by increased call traffic.

According to the preferred embodiment of the present invention, the VRU 24 is made by Digital Sound Corporation of Santa Barbara, California. Each VRU 24 has up to 96 ports per rack, requires 4 kW continuous power (20A @125 V), and generates 12,000 BTU's per hour. The Digital Sound Corporation VRU contains within it a voice recognition package 24*a* and a voice synthesis package 24*b* provided by Digital Sound Corporation. The VRU is a UNIX-based system which includes a 68000/80386 CPU with 2 to 8 MB of memory. The digital signal processors 23 each consist of a TMS 23020.

Connected to the VRU computer is a voice/data storage medium 26 and an exchange media 28. The storage medium 26 may include up to 4 GB of memory.

The telephone switch of the telephone switching matrix 22 consists of a switching system made by Redcom Laboratories, of Victor, N.Y. The telephone switch is a fully digital class 5 office switch, which requires 1 kW continuous power (85A @48 V or 10A @125 V), and generates 3,000 BTU's per hour. The Redcom switch includes up to 448 ports, non-blocking.

It is understood that any comparable system for either the VRU or the telephone switching matrix may be used to build the present invention.

The local nodes 14 shown in FIG. 2B will not support telephone switching matrix or VRU equipment on the premises, but are configured with digital (T1) multiplexors 29 which are connected to the closest regional network node via optical fiber transmission lines 11. Calls placed to the local nodes will be routed through the telephone switching matrix/VRU at the closest regional network node. Output from the local nodes 14 will be over lines 18. Local nodes can be updated to regional nodes if the local traffic load exceeds the capacity of twenty-four lines for a period of at least six months.

FIGS. 3-7 each schematically demonstrate the various features of the System which are available to the subscriber 30.

As shown in FIG. 3, the subscriber 30 dials the System and reaches the System main menu 32. Under the main menu, the subscriber may choose the easy dial service 34, the messaging service 36, the direct dial service 38, the service menu 40, or the business assistant 42.

The choice of the easy dial service 34 gives the subscriber access to his personal phone directory 35, with reference to which he may have the VRU 24 place his calls for him. The choice of messaging service 36 allows the user to leave a digitally recorded voice message 37. The choice of direct dial service 38 allows the user to dial the desired number through the telephone keypad 39. The choice of the service menu 40 allows the user to access such services as local restaurant guide, customer service, express cash machines, traveller service organizations, instant gift services, reservations, and various sponsor routines, as shown in block 41. The choice of

the business assistant 42 allows the user to access services such as call conferencing, remote call forwarding, and call recording as shown in block 43.

As shown in FIG. 4, when a person 30 dials the main menu 32, if he is a new subscriber, and it is his first access to the System, as determined by the number through which he is connected to the System, he is passed to the subscriber registration routine 50. While in registration routine 50, the subscriber enters his personal data at block 52, his home or office telephone number at block 54 and the credit card number to which he wishes the bills to be charged at block 56. Then he selects his password at block 58. At this time he may choose to create his personal dialing directory 60, or postpone the creation of this directory until a later time. If he chooses to create the personal dialing directory, he enters the easy dial information at block 61, designates his VIPs or guests at block 62, and enters a remote call itinerary if he so desires at block 63.

As shown in FIG. 5, a subscriber 30 who calls into the System main menu 32 may leave a message for a called party. If the called party is a VIP, shown at block 66, or a guest, shown at block 68, the System may repeatedly dial the dialed party's phone number until it can deliver the recorded message left by the subscriber, or a message may be recorded and left for later retrieval.

As shown in FIG. 6, a subscriber 30 who is called by a third party may either be reached by remote calling at block 70, or messaging at block 72. In particular, if the third party is a VIP 74, the System will automatically forward his call to the number which the subscriber has left at which he can be reached, if such a number has been entered by the subscriber 30. If the calling party is a guest 75, the caller can record a message for later retrieval by the subscriber 30.

As shown in FIG. 7, the subscriber 30 may access the sponsor database menu 80 through the service menu 40 and the main menu 32. If he does so, he may be provided with pre-recorded information 82 or if he so desires, be connected directly to customer service 84. If he accesses the pre-recorded information 82, he can access information such as the nearest TSO locations, the nearest express cash and ATM locations, or the local restaurant guide, 85-87.

FIG. 8-20 illustrate flowcharts showing the logic flow of the software routines for implementing the voice driven software system that controls the telephone switch 22 and the VRU 24.

FIGS. 8A and 8B illustrate the start-up and main menu routines. In particular, shown in FIG. 8A, when the user dials the telephone number for System access, the routine is started at node RSP1. The user is asked to dial his account number at step 1000. At step 1002, the System checks whether the account number is in the account database. If not, the routine is directed to node RGN1, the new subscribers' routine, shown in FIGS. 20A and 20B. If the account number is found in the database at step 1002, the user is asked to speak or dial his password at step 1004. At step 1005, the System checks to determine whether the password is understood. If not, the user is asked to repeat his password. It is understood that if the password is not understood after a number of tries, for example three tries, the user will be cut from the system by termination of the call after an appropriate error message is delivered (not shown in flowchart). The System accesses the stored subscriber information (not shown in flowchart) to determine if the account number and password spoken or dialed by the user matches one of the stored account numbers and corresponding password. If so, the user is identified as a subscriber.

Once the user's password is understood and recognized by the System as that of a subscriber, the subscriber is welcomed to the System at step 1006, with an indication of how many messages are awaiting the subscriber's retrieval. At this point, the System enters the routine starting at node PDVC0, shown in FIG. 8B.

At the time the subscriber registers, a novice bit is set. This bit is automatically turned off after the subscriber has accessed the System a number of times, the assumption being that after repeated access, the experienced subscriber does not need the detailed instructions required by the novice subscriber. At step 1008, the novice bit is checked. If the subscriber is not a novice, the subscriber is asked to tell the system to dial a number, representing either a menu selection or a telephone number to be dialed, shown at step 1012. The System delivers a message indicating a brief dialing delay at step 1014. Control is then passed to node PDVC2, shown in FIG. 9A and 9B.

If at step 1008, the novice bit is determined to be set, the main menu is recited to the subscriber at step 1010, requesting that the subscriber dial: a "1" to make a call, a "2" for messaging, a "3" for the business assistant, or a "4" for the service menu. At step 1016, if the subscriber has chosen or dialed a "1", control is passed to node PDVC2 shown in FIGS. 9A and 9B. If the subscriber has dialed a "2" at step 1018, control is passed to node MSG3, illustrated in FIG. 11. At step 1020, if the subscriber has dialed a "3", control is passed shown in FIGS. 13A and 13B. At step 1022, if the subscriber has dialed a "4", control is passed to node SVCM1, shown in FIG. 14.

If none of these numbers have been dialed, control is passed to an error routine which gives an appropriate error message. This routine may be designed so that it affords the subscriber multiple retries to dial the correct number. Upon repeated failures, the subscriber will be connected directly to customer services to obtain assistance from an operator.

A routine entitled node PDVC2 is illustrated in FIGS. 9A and 9B. As shown in FIG. 9A at step 1030, the subscriber is informed that the System is calling the intended party, by vocalizing his name or initials. The subscriber is informed that in order to leave a message or make another call, he can dial a "1" at any time.

In this way, the subscriber may terminate the call while remaining connected to the System at any time he desires. Thus, if the subscriber is dialing a number which, for example, is located in a small apartment, he may realize that if the phone is not answered within five rings or four rings, the party is not there and he can dial a "1" to leave a message at that point. Likewise, if the subscriber is dialing a party located in an office, or a party who has difficulty reaching the telephone, he may keep ringing the telephone for as many rings as he chooses prior to dialing the "1" to leave a message.

At step 1032, if the subscriber has not dialed a "1" after a given period of time, the System may initiate an error routine, which provides an appropriate error message to the subscriber. If the System detects a "1", the subscriber is asked to dial a "1" to leave a message or "0" to place another call, at step 1034. If a "1" is dialed, at step 1036, the subscriber is passed to node MSG1, described in FIGS. 10A and 10B.

If a "1" has been dialed at step **1036**, the subscriber is asked to speak the name of the party to whom he wishes to place the call at step **1038**. If the name is understood at step **1040**, the routine passes to node PDVC2 shown at the top of FIG. **9A**. If the name is not understood, the subscriber is asked to repeat the name at step **1042**. At step **1044** the System determines whether the name has been understood. If so, control passes to node PDVC2.

If the name is not understood after the second time, the subscriber is asked to dial the initials of the party he wishes to call, at step **1046**. As shown in FIG. **9B**, if these initials are found in the database at step **1048**, control is passed to node PDVC2. If they are not in the database, the subscriber is given the choice of whether he wishes to make another call by dialing a "0", or update his dialing directory by dialing a "1", shown at step **1050**. If a "0" is dialed, at step **1052** control is passed to node PDVC0, the main menu shown in FIGS. **8A** and **8B**. If a "1" is dialed, at step **1054** control is passed to node PDD0, the routine for updating the personal dialing directory shown in FIG. **15**. If neither a "0" or a "1" has been dialed at this point, an appropriate error routine is entered and the appropriate error message is delivered.

FIGS. **10A** and **10B** illustrate the routine which is entered in order to leave a recorded message which starts at node MSG1. At step **1060**, the subscriber is asked to begin dictating his message using message storage means **24e**. At step **1062**, the subscriber is asked whether he wishes to replay his message for review. If he chooses to do so, at step **1064** the message is played back and he is asked again whether he wishes to replay it. At step **1066**, the subscriber has the opportunity to rerecord the message if he is not satisfied with it.

At step **1068**, the System decides whether the person for whom the message is directed is a VIP or a guest. If so, the user is given the opportunity, at step **1070**, to choose from the following selections: "1" to keep trying the party, "0" to place another call, or "2" to store the message for later retrieval by the called party. At step **1072**, if a "2" has been dialed, the message is stored for the person to call in and retrieve at a later time. Control then passes to node MSG2D shown at step **1090** in FIG. **10B**. If a "1" is dialed at step **1074**, control passes to step **1080** which is described below. If a "0" is dialed, at step **1076** control passes to node PDVC0. If none of those are chosen, control is passed to an error routine which delivers an appropriate error message.

If the subscriber or the called party is not a VIP or a guest at step **1068**, and is not a non-directory party at step **1078**, an error routine is accessed and the appropriate error message is delivered. If the party is a non-directory party, control is passed to step **1080**.

At step **1080**, the subscriber is asked to dial the time at which he wishes the System to start calling the designated party to deliver the message which the subscriber has recorded. At step **1082**, the subscriber is informed that the System will try every 15 minutes for two hours after the indicated time (repeat dialing means **24C**). He is given the opportunity, at steps **1084** and **1086** (see FIG. **10B**) to change the designated time or indicate that the time as set is okay. If neither selection is chosen, an error routine is entered.

If the time is correct as chosen by the subscriber, at step **1088** the System executes, in the background, the routine which starts at node MDL1, shown in FIG. **12**, for message delivery. The subscriber, in the foreground, is then asked, at step **1090**, whether he wishes to leave a message for someone else by dialing a "1" or place another call by dialing a "0". Node MSG2D is indicated immediately prior to step **1090**. At step **1092**, if the subscriber has dialed a "1", control is passed to node MSG1. At step **1094**, if the subscriber has dialed a "0", control is passed to node PDVC0, shown in FIG. **8B**. If neither of these options are chosen, an appropriate error message is delivered.

FIGS. **11A**, **11B** or **11C** illustrate the routine for retrieving messages which starts at node MSG3. At step **1100** the subscriber is asked whether he wishes to retrieve messages by dialing a "1" or leave messages by dialing a "2". If the subscriber dials a "2" at step **1102**, control is passed to the portion of the routine which drives the leaving of messages, at step **1120**. If, at step **1104** the subscriber has dialed a "1", the System determines at step **1106** whether any messages are stored for retrieval by the subscriber. If neither a "1" or "2" has been chosen, at step **1104** an appropriate error message is delivered.

If at step **1106** any messages are stored, control passes through node MSG4 to step **1110**. At step **1110**, the subscriber is told either that the message for a particular person was delivered at a particular time to the party to whom it was delivered or that the message was received from a particular person at a particular time on a particular date. In each case, the System fills in the particular variables which are appropriate at the time. At step **1112**, the subscriber is asked whether he would like the message to be repeated or would like to hear the next message. At step **1113**, if the subscriber dials a "1", control is passed to node MSG4 and the message is repeated. At step **1115** if a "2" is dialed, indicating that the subscriber chooses to hear the next message, the System checks at step **1117** (see FIG. **11B**) whether there are any more messages. If so, the message counter is incremented for accessing the next message (step **1111**) and control is passed back to step **1110**. If there are no further messages, at step **1114** the subscriber is so informed and given the choice to dial a "1" to leave a message or "0" to place another call. Control is passed to step **1116**.

At step **1106**, if no messages appear for the subscriber, he is so informed and asked whether he would like to leave a message or place another call at step **1108**.

As shown in FIG. **11C**, if the subscriber has dialed a "0", at step **1116** the control is passed to node PDVC0. If at step **1118** the subscriber has dialed a "1", control is passed to the portion of the routine in which the subscriber may dial a number to leave another message, shown at step **1120**. If neither a "0" or a "1" has been dialed, an appropriate error routine is entered and an error message is delivered.

At step **1120**, the subscriber is asked to speak the party's name to which he wishes to place a call or to dial a party's initials. At step **1122**, the System determines whether the party's name or initials was understood. If so, control is passed to node MSG1. If not, an appropriate error message is generated. It is understood that here, as in FIG. **9A** steps **1038-1046**, the subscriber is given a number of opportunities to speak the name so that it is understood by the System.

In FIGS. **12A** and **12B**, the routine which is used for message delivery is illustrated, beginning with node MDL1. In the event the subscriber has indicated that he wishes the System to repeatedly dial a party's number in order to deliver a message at steps **1170** and **1188** in

FIGS. 10A and 10B, the System dials the called party's number.

When the call is answered, at step 1130 the System tells the answerer that it has a message from a particular person for a particular person, where the System inserts the names of the people involved. The person who answers the phone is asked to dial a "1" if they are the person to whom the message is to be delivered, a "2" if they can take the message for the other person, a "3" if they would like the system to wait for a time while the person to whom the message is to be delivered comes to the phone, or "4" if the System should call back at a later time.

At step 1132, if a "1" has been dialed, control is dialed at step 1133, the System asks the person to speak his or her name so that it may be recorded and used to confirm delivery of the message, shown at step 1140. If a "3" has been dialed at step 1134, the System merely enters a wait stage until a "1", "2", or a "4" is dialed. At step 1135, if a "4" is dialed, the System enters a routine which allows it to call back at a later time. If none of these numbers are dialed, an appropriate error message is delivered.

At step 1142 (FIG. 12B), the System delivers the recorded message and at step 1144 asks whether the subscriber would the like the message to be repeated or whether the message was understood. If at step 1146 the subscriber dials a "1" to request that the message be repeated, control is passed back to step 1142. If a "2" has been dialed at step 1148, control passes to step 1150, at which point the answerer is given prerecorded information relating to the System. After step 1150, the message delivery routine is ended. If neither a "1" nor a "2" has been dialed at step 1148, an appropriate error routine is entered and an error message is generated.

FIGS. 13A and 13B illustrate the business system routine which is entered at node BASS1. At step 1160, the subscriber is informed that he has entered the business assistant portion of the System and is given the choice of the call forwarding option, the call conferencing option, or the call recording option.

It is important to note that the features presented in the business assistant, as well as the messaging services, are available at anytime in the middle of a call. This is particularly important with respect to the call conferencing feature in that if the subscriber is speaking with one party and during the middle of the call requires that another party be added to that call, he need only dial a "0" to return to the main menu, followed by "3" for the business assistant, followed by a "3" for the call conferencing feature.

At step 1162, if the subscriber has dialed a "3" indicating the call recording feature, he is informed at step 1164, that the feature is only available for interstate calls and he is asked to confirm by dialing a "1" that it is an interstate call, or dial a "0" to return to the main menu. At step 1166 if a "0" has been dialed, control passes to node PDVC0. At step 1168 if a "1" has been dialed, control passes to step 1170. If neither is dialed, the appropriate error message is generated after entry of the appropriate error routine. At step 1170, the subscriber is informed of the charges associated with the call recording feature and at step 1172, the subscriber is asked to indicate the number that he would the System to call and control is passed to node PDVC2. This call will be digitally recorded and stored in the System's data storage files 26 for later retrieval, as with any recorded message.

At step 1174 if a "2" has been dialed indicating the call conferencing feature, control passes to step 1176. At step 1176, the subscriber is informed that up to seven calls may be added by dialing a "1" followed by either saying the name as stored in the personal directory or dialing the telephone number. Control is then passed to node PDVC2.

At step 1178, if a "1" is not received, but another number has been dialed in error by the subscriber, an appropriate error message is delivered upon entry into an error routine.

A "1" at step 1178 indicates that the subscriber has selected the call forwarding feature. At step 1180, shown in FIG. 13B, the subscriber is asked whether he would like to indicate a number to which calls may be forwarded by dialing a "1", or whether he would like to cancel the previous forwarding number by dialing a "0". At step 1182 if a "0" has been dialed, the forwarding number is cancelled at step 1184, and control passes back to node BASS1. At step 1186 if a "1" has been dialed, control passes to step 1188. If neither a "0" or a "1" has been dialed, the appropriate error message is delivered.

At step 1188, the subscriber dials a number to which his calls from VIPs may be forwarded and he is asked to confirm the number as dialed or redial the number. At step 1190, the subscriber is asked if the number belongs to a "cellular" phone, or to a regular phone. At step 1192, if a "1" has been dialed, indicating a "cellular" phone, the area code of use of the "cellular" is obtained at step 1194. If a regular phone has been indicated, control passes to node BASS1, after a thank you message is delivered at step 1198. If neither "1" nor a "0" is received, an appropriate error message is generated upon entry of an error routine. At step 1198, a thank you message is delivered and control passes back to node BASS1.

FIG. 14 illustrates the service menu routine starting at node SVCM1. This routine is merely a menu routine which is selected from the System main menu. At step 1200, the subscriber is given a choice as to whether he wants to update his personal dialing directory, or access the travel guide, the instant gift services, the sponsor database, or return to the main menu. As the passage of control is clear from flowchart, the figure will not be further discussed herein.

FIG. 15 illustrates the routine entered when the subscriber chooses to update his personal dialing directory from the service menu. The routine, which starts at node PDD0, begins, at step 1220, by telling the subscriber how many entries he currently has in his dialing directory and asking him whether he would like to receive instructions by dialing a "1" or update his directory by dialing a "2". At step 1221 the System sets a flag internally if the subscriber has no entries in his directory. At step 1222, if a "1" has been dialed, control passes to node PDD1, described in FIG. 16A. At step 1224 if the subscriber dials a "2", control passes through node PDD0A to step 1226. If neither a "1" or "2" has been dialed, an appropriate error routine is entered.

At step 1226, the subscriber is asked to choose whether he would like to add names to the directory by dialing a "1", delete names from the directory by dialing a "2", or return to the service menu by dialing a "0". At step 1228 if a "0" has been dialed, control is passed to the service menu routine, node SVCM1 described in FIG. 14. At step 1230 if the subscriber chose to delete a name by dialing a "2", at step 1232 he is asked to speak

the name which he would like to be deleted or dial the initials for that name. At step 1234, he is asked to confirm the deletion or cancel his request (specifics not shown in the flowchart) and control is passed back to node PDD0A to give him the opportunity to further update his directory. At step 1236, if the subscriber chooses a "1", control is passed to node PDD1E described in FIGS. 16B and 16C. If neither a "0", "1" or "2" has been chosen, an appropriate error routine is entered.

FIGS. 16A, 16B, and 16C describe the routine for creating a new personal dialing directory. This routine is entered when the person is a new subscriber and is creating his personal dialing directory for the first time.

FIG. 16A starts at node PDD1. At step 1240, the instructions concerning the operation of this routine are delivered to the subscriber. The subscriber is then given the opportunity to indicate whether he would like the instructions to be repeated or whether he would to proceed at this time. If neither option is chosen, an appropriate error routine is entered.

At step 1242, if the subscriber chooses a "2" to repeat the instructions, the instructions are repeated by returning to step 1240. In the event the subscriber chooses to proceed and so dials a "1", step 1246 determines whether the entry is the first or second to be made in the new directory by means of a flag which has been set in the System software (see FIG. 15, step 1221). The first entry in the directory is the home number while the second is the office number of the subscriber.

If it is the first entry, steps 1248-1252 allow the System to obtain three samples of the subscriber's home and office telephone numbers, as spoken by the subscriber. Three samples are necessary for the speaker dependent voice recognition system to accurately identify the speaker when he speaks the sample phrase at a later time. The home and office numbers are confirmed by the subscriber at step 1250 and the account record number record is updated by the System at step 1252.

At step 1246, if the entry made is not the first or second entry in the directory, control is passed directly to node PDD1E, shown in FIGS. 16B and 16C.

After the subscriber has entered his home and office number, at step 1254, he is informed that he will be asked for names, initials, and telephone numbers to be added to the directory and asked if he would like to proceed or return to the service menu. If he chooses a "0" at step 1256, control is returned to the service menu, node SVCM1 described in FIG. 14. If he chooses to proceed by dialing a "1" at step 1258, the System will allow him to add further names to the directory.

At step 1260, the subscriber is asked to speak the last name of the person to be entered into the directory three times. At step 1262, he is asked to dial first and last initials of that person. Step 1264 checks the current directory to determine whether he has previously entered a person's name having the same first and last initials as dialed. It is understood that these are telephone initials and that there is a possibility of duplication. In the event that a previous entry have the same initials as that just dialed, he is asked to provide a middle initial at step 1266 for further identification. At step 1268, the subscriber is asked to dial the telephone number to be stored including the area code.

At step 1270, shown in FIG. 16C, the subscriber is asked to identify the person just entered as a VIP if he so desires, by dialing "1". He may dial a "2" if he would like to proceed with the next entry. If a "2" chosen at step 1272, control passes back to node PDD0A, shown in FIG. 15. If a "1" is chosen at step 1274, control passes to step 1276. If neither is chosen, an error routine is entered. At step 1276, the System updates the account record appropriately indicating that the person entered into the directory is a VIP.

As mentioned above, designating a person as a VIP gives him additional privileges within the System. In particular a call from a VIP may be forwarded directly to the subscriber's telephone number upon request by the subscriber by entering the business System routine and using the call forwarding option.

At step 1278, the subscriber is given the opportunity to contact customer service to obtain additional calling cards for VIP's by dialing a "1". If the subscriber would like, he may dial a "2" to make another entry into the directory or a "0" to return to the main menu. If the subscriber chooses a "0" at step 1280, control is passed node PDVC0 described in FIG. 8B. If the subscriber dials a "2" at step 1282, control is passed to step 1260, shown in FIG. 16B. If the subscriber chooses a "1" at step 1284 to be connected to customer service, the System dials the customer service number and connects the subscriber to the customer service department. If neither of a "0", "1", or "2" has been dialed, an appropriate error routine is entered.

FIG. 17 illustrates the routine for accessing the sponsor travel guide information, beginning at node SPONSOR1. At step 1290 the subscriber is asked whether he would like to retrieve information relating to the closest travel services, cash machines or travellers check dispensers by dialing a "1" or access other services by dialing a "2". If the subscriber chooses a "2" at step 1292, he is connected to the sponsor's customer service center. At step 1294 if the subscriber chooses a "1", control is passed to step 1296. If neither a "1" or "2" is chosen, an appropriate error message is generated upon entry into and error routine.

At step 1296, if Automatic Number Identification (ANI) is not available, the subscriber is asked to dial the area code and telephone number from which the call is originating at step 1298. Once the System determines the location of the originating telephone at step 1300, either from ANI or from the subscriber, the subscriber is informed of the nearest travel service, cash machine, or travellers check dispenser with the address, telephone number and hours of operation thereof. At step 1302, the subscriber is asked whether he would like to have this information repeated or place another call. If the subscriber chooses to repeat the information by dialing a "1" at step 1304, control is passed back to step 1300. If the subscriber dials a "0" to place another call, control is passed to node PDVC0. If neither number is dialed, an appropriate error message is delivered upon entry into an error routine.

FIGS. 18A and 18B disclose the travel guide routine of the System. The routine is entered at node TGUD1. At step 1310, the subscriber is asked to dial a "0" to return to the service menu, a "1" to make reservations, a "2" to access the restaurant guide, or "3" to access emergency services. At step 1320, if none of those options are chosen, an error routine is entered.

At step 1312, if the subscriber has chosen a "0", control is passed to node SVCM1 for the service routine described in FIG. 14. At step 1314, if the subscriber chooses a "1", he is connected to 24-hour reservation center at step 1316, followed by termination of that call. If the subscriber chooses a "3" at step 1318, control is

passed to node SPONSOR1 for the emergency services routine described in FIG. 17. If the subscriber chooses a "2" at step 1320, control passes through node RGUD1 to step 1322.

At step 1322, the subscriber is asked to dial the originating area code and telephone number so that the System may use this information to access the restaurants nearest to the subscriber's location. At step 1324, the subscriber is asked to choose the type of food he desires, such as steak houses, seafood, French, Italian, Chinese, or Japanese cuisine. At any time during the access to the restaurant guide, the subscriber may dial "0" to be returned to the travel guide menu at step 1310 (not shown in flowchart).

At step 1326, shown in FIG. 18B, the database is accessed based on the type of food chosen by the subscriber. At step 1328, the System recites the selections of the closest restaurants, if any, providing the opportunity, at any time, for the subscriber to request that the System call the restaurant directly by dialing the number. If the System is told to dial a particular number, by the user pressing a predetermined telephone key (not shown in flowchart), at step 1330 the subscriber is asked to confirm the selection.

At step 1332, the subscriber is asked to dial a "1" to be connected directly to the restaurant or a "0" to return to the travel guide menu. At step 1334 if the subscriber dials a "1", a call placed to the restaurant chosen. At step 1336, if the subscriber chooses a "0", control is returned to node TGUD1. If neither option is chosen, an appropriate error routine is entered and an error message is delivered.

FIG. 19 illustrates the routine which is accessed by the subscriber if he chooses the instant gift services option of the service menu. The routine is entered at node GIFT1 and starts at step 1340 by informing the subscriber of the charges for ordering roses or chocolates and giving the subscriber the following options. He may dial a "1" to order roses, a "2" to order chocolates, or a "0" to return to the service menu.

At step 1342, if the subscriber dials a "0", control is passed to the service menu at node SVCM1 described in FIG. 14. At step 1344, a flag is set based on the subscriber's response to whether he would like to order roses or chocolates. At step 1346, the subscriber is asked to enter the name, address and phone number of the person to whom the delivery is to be made. At step 1348, a thank you message is delivered and the subscriber is asked to dial a "1" to send another gift or a "0" to return to the service menu. If he dials a "1" at step 1350, control is passed to node GIFT1. If the subscriber dials a "0" at step 1352, control is passed to node SVCM1. If neither is chosen, an appropriate error message is delivered upon entry into an error routine.

FIGS. 20A and 20B describe the subscriber registration routine which a person accesses when he is a first time caller entering the System to become a subscriber. The routine is entered at node RGN1 and at step 1360, the person is given instructions for proceeding through the new subscriber routine. He is asked to dial a "1" when he is ready to proceed.

At step 1362, the System obtains the first, middle initial, last name and the address including the zip code of the person. In particular, the person is asked to speak his name and address and dial his zip code. At step 1364, the System replays the information obtained in step 1362 for confirmation and he is given the opportunity to correct any mistakes, although this portion is not shown in the flowchart. At step 1366, the information concerning his name and address will be transcribed by System operators.

At step 1368, the person is asked to dial his home and office numbers and confirm that they have been correctly dialed. At step 1370, the System obtains the credit card number and information from the person. The person can then be billed directly to this credit card.

At step 1372, the person is asked to speak a password three times. The speaker may choose the password so that he will remember it and is asked to speak it three times so that the System will be able to identify him correctly at a later date. At step 1374 (FIG. 20B) he is asked to dial the first four letters of the password for storage by the System. At step 1376, the person is asked to choose a word which the System will recognize as his instruction to place a telephone call, such as "phone", "call" or "get". Again, the person is asked to repeat this word three times for later recognition. At step 1378, the person is likewise asked to choose a word which the System will recognize as an instruction to check his messages, such as "messages". Again, the person is asked to repeat this word three times. At this time it may also be possible to have the subscriber select other key words for selected functions, such as making another call (returning to the main menu), leaving a message, etc.

At step 1380, an appropriate thank you message is delivered and the person is asked to use a "1" to set up his personal speed dialing directory, a "4" to return to the service menu or a "0" to return to the main menu or call back later. At step 1382, if the person chooses a "4", control is passed to node SVCM1 described in FIG. 14. At step 1384, if a "1" is chosen, control is passed to node PDD0 described in FIG. 15. At step 1386, if the person chooses a "0", control is passed to node PDVC0 as described in FIG. 8B. If none of these options are chosen, an appropriate error message is delivered upon entry into an error routine.

FIGS. 21A and 21B illustrate the routine by which a person who is not a subscriber accesses the System to retrieve his messages. The routine is entered at node VGC1 when the person's call comes in on a particular INWATS number which is given by the subscribers to their guest and VIPs. At step 1400, the person who has dialed the System is asked to enter his party's (i.e. subscriber's) telephone number including area code. At step 1402, the System checks whether the number dialed belongs to a subscriber. If not, an appropriate error routine is entered.

At step 1404, the person is asked to dial his home or office telephone number. At step 1406, if the dialed number does not belong to a guest or VIP of the identified subscriber, an appropriate error routine is entered. If the person is a guest or a VIP and messages have been stored for him, at step 1408, control is passed to step 1409 where he is given an appropriate thank you message and told whether he has any messages which has been stored in the System. Control is then passed node MSG4, described in FIGS. 11A, 11B and 11C.

At step 1410 the System determines whether the caller is a VIP. If not, step 1412 asks the caller, i.e. a guest, to dictate a message after the tone. Step 1414 lets the caller review and/or rerecord the previously dictated message, after which the call is terminated.

At step 1416, the System determines whether the VIP's call is local, that is that the subscriber has not left

another number to which his VIPs' call should be forwarded. If there is no forwarding number, step **1418** indicates to the caller that the original number is being dialed and that he may dial a "1" at any time to leave a message. If a "1" is received, control is passed to node **MSG1**, described in FIGS. **10A** and **10B**.

At step **1420**, it is determined whether a call forwarding number has been left for the VIP. If not, an error routine is entered. If there is a call forwarding number, at step **1422** shown in FIG. **21B**, the caller is so informed, and at step **1424** the call forwarding number is dialed and he is informed that he may dial a "1" at any time to leave a message. At step **1426** if a "1" is not received by the System after a given period of time, the System may enter an error routine. At step **1428**, assuming a "1" has been received by the System, the caller is asked to dictate a message. At step **1430** the VIP is asked if he would like to review his message, rerecord the message or end the call. Steps **1432** through **1438** clearly describe the sequence of events based on the options shown in step **1430**.

Although not specifically included in the flowcharts, the System will extensively use novice bits which are automatically turned on and off in response to the subscriber's usage of the System. In this way, the System will be able to adapt itself and the instruction texts delivered to each individual subscriber to tailor itself to that subscriber's usage level. It is understood that the particular implementation of these novice bits is within the ordinarily skilled artisan.

It is understood that the error routines entered, and the error messages delivered by the System will depend on the situation which has caused the error. The particular configuration of these routines and messages are well within capabilities of the ordinarily skilled artisan.

It is understood that the specific words used in the scripts prerecorded and used by the software are variable and so have not been specifically enumerated for each routine. Any scripts which instruct the user to use the System are contemplated by the present invention.

It is further understood that the records in the account database will be updated at frequent times during the software. These updates are not always enumerated in the above description but are well within the capabilities of the ordinarily skilled artisan. Likewise, access by the software to the various databases is not always specifically pointed out but would be clear to an ordinarily skilled artisan from the program context.

It is understood that at any time the subscriber may dial a "0" to return to the previous menu. Thus he may return to the main menu to place another call by going back through whatever levels of menus he is currently at in order to get the main menu. Thus, at the termination of any call, the subscriber merely dials a "0" to end the call and make another one, without having to reaccess the System.

The foregoing description of the specific embodiments will so fully reveal the general nature of the invention that others can, by applying current knowledge, readily modify and/or adapt for various applications such specific embodiments without departing from the generic concept, and, therefore, such adaptations and modifications should and are intended to be comprehended within the meaning and range of equivalents of the disclosed embodiments. It is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation.

What is claimed is:

1. A telephone communications node comprising:
a telephone switch having at least one incoming line and at least one outgoing line for switching calls therebetween;
an audio response unit for receiving incoming audio communications and for generating and transmitting other audio communications; and
single control means for executing a stored program sequence based upon the incoming audio communications received by said audio response unit, said control means and said program sequence directly controlling both said audio response unit and said telephone switch such that, based on said incoming audio communications and said stored program sequence, a call received by the telephone communications node may be switched to an outgoing line directed to a number other than that which the caller originally called,
wherein said control means comprises
generating means for generating a user-interactive main menu;
access means for providing access to a user-defined speed dialing directory;
message means for delivering a vocal message to a particular person at a particular telephone number;
dialing means for providing direct dialing of user-chosen telephone numbers;
sponsor means for providing access to a sponsor database; and
business means for providing user-chosen business assistant functions.

2. The telephone communications node according to claim 1, wherein said access means comprises:
instruction means for providing instructions to enable said user to create said speed dialing directory, said speed dialing directory being accessed by a code representing each telephone number stored in the directory;
code means for obtaining at least one chosen code from said user representing at least one particular party to be called; and
retrieval means for retrieving at least one telephone number stored in said directory which corresponds to said at least one chosen code.

3. The telephone communications node according to claim 1, wherein said message means comprises:
message storage means for recording and storing said vocal message responsive to an instruction received from said user;
repeat dialing means for repeatedly dialing said particular telephone number until a response is received for a predetermined time at predetermined time intervals; and
message relay means for replaying said stored message upon receiving said response.

4. The telephone communications node according to claim 1, wherein said dialing means comprises obtaining means for obtaining said user-chosen telephone numbers.

5. The telephone communications node according to claim 1, wherein said business means comprises:
conferencing means for providing call conferencing;
forwarding means for providing call forwarding for forwarding a call from a particular person to a user's remote location; and
recording means for recording a call.

6. A telephone communications node for providing telephone communication services to a subscriber, comprising:

a telephone switch having at least one incoming and at least one outgoing line for switching calls therebetween;

an audio response unit for receiving incoming audio communications from the subscriber and for generating and transmitting other audio communications to the subscriber;

a stored program sequence programmed with information supplied by the subscriber; and

single control means for executing said stored program sequence based upon the incoming audio communications received by said audio response unit from the subscriber, said control means and said program sequence directly controlling both said audio response unit and said telephone switch such that, based on said incoming audio communications and said stored program sequence, a call received from the subscriber may be switched to an outgoing line directed to a number other than that which the subscriber originally called.

7. A telephone communication node in accordance with claim 6, wherein said control means and said program sequence include directory means for receiving directory programming information from the subscriber, including telephone numbers and codes corresponding thereto, and permitting said directory information to be accessed by the subscriber by said codes corresponding to each of said telephone numbers entered in the directory, whereby, upon receipt from the subscriber of an incoming audio communication representing one of said codes, the call received from the subscriber is switched to an outgoing line directed to the number programmed by the subscriber as corresponding to said code.

8. A telephone communication node in accordance with claim 6, further including identification means for verifying that a caller is a subscriber.

9. A telephone communication node in accordance with claim 6 wherein said telephone switch includes a plurality of local network nodes, each having a plurality of incoming and outgoing telephone trunk lines, each of said local network nodes being connected to a regional network node; and wherein said audio response unit, said stored program sequence and said single control means are part of said regional network node.

10. A telephone communication system, comprising:

at least two telephone communication nodes in accordance with claim 9; and

a central network control system connected to each of said regional network nodes, for controlling administrative functions associated with said telephone communication system.

11. The telephone communications node according to claim 6, wherein said audio response unit comprises recognition means for performing speaker recognition.

12. The telephone communications node according to claim 11, wherein said recognition means performs speaker dependent voice recognition.

13. The telephone communications node according to claim 6, wherein said audio response unit comprises generating means for voice generation for delivering said other audio communications according to predetermined user scripts.

14. The telephone communications node according to claim 13, further comprising digital storage means for storing said predetermined user scripts.

15. The telephone communications node according to claim 6, further comprising a central processing unit connected within said audio response unit wherein said stored program sequence is stored within said central processing unit.

16. The telephone communications node according to claim 6, further comprising a central processing unit external to said audio response unit and connected thereto wherein said stored program sequence is stored within said central processing unit.

17. The telephone communications node according to claim 6, wherein said telephone switch is a digital telephone switch.

18. The telephone communications node according to claim 6, wherein said incoming audio communications comprise voice and touch-tone signals.

19. The telephone communications node according to claim 6, further comprising connecting means for connecting said audio response unit to said telephone switch.

20. A telephone communication node in accordance with claim 6, wherein said control means controls said audio response unit and said telephone switch such that the switch to an outgoing line is based on information generated by said stored program sequence.

21. A telephone communications node in accordance with claim 6, wherein said audio response unit and said single control means include generating means for generating a user-interactive main menu.

22. A telephone communications node in accordance with claim 6, wherein said single control means includes access means for providing access to a user-defined speed dialing directory and for connecting the subscriber to a number from said directory selected in response to audio communications received from the subscriber.

23. A telephone communications node in accordance with claim 6, wherein said audio response unit and said single control means include message means for delivering a vocal message provided by the subscriber to a specified party at a specified number.

24. A telephone communications node in accordance with claim 6, wherein said audio response unit and said single control means include dialing means for switching the incoming call to a subscriber-chosen telephone number.

25. A telephone communications node in accordance with claim 6, wherein said single control means includes conferencing means for providing call conferencing of the incoming call with at least two numbers other than that which the subscriber originally called.

26. A telephone communications node in accordance with claim 6, wherein said audio response unit and said single control means include recording means for recording a call.

27. A telephone communications node in accordance with claim 6, wherein said telephone switch includes a plurality of local network nodes, each having a plurality of incoming and outgoing telephone trunk lines, each of said local network nodes being connected to a regional network node; and wherein said audio response unit and said single control means are part of said regional network node.

28. A telephone communication system, comprising:

at least two telephone communications nodes in accordance with claim 27; and

a central network control system connected to each of said regional network nodes, for controlling administrative functions associated with said telephone communication system.

29. The telephone communications node according to claim 27, wherein each of said local network nodes comprises a digital multiplexor.

30. The telephone communications node according to claim 27, further comprising optical fiber transmission facilities connecting each of said local network nodes to its respective regional network node.

31. A method of providing telephone communication services to a subscriber, comprising:

programming a common stored program sequence in accordance with instructions from the subscriber;

upon receipt of a call from the subscriber, producing audio messages according to a stored user script;

accepting audio user commands from the subscriber in response to said audio messages;

processing said accepted commands; and

directly controlling, using said common stored program sequence, both a telephone switch and an audio response unit responsive to said processed commands such that, based on said audio user commands and said common stored program sequence, the received call is switched to an outgoing line directed to a number other than that which the subscriber originally dialed.

32. A method of providing telephone communication services to a subscriber, in accordance with claim 31, further including the step of identifying a caller as a subscriber

33. The method of claim 31, wherein said step of accepting audio user commands comprises the step of receiving voice signals from a user over a telephone line.

34. The method of claim 33, wherein said step of processing said audio user commands comprises the step of analyzing said audio user commands using a voice recognition unit.

35. The method of claim 34, wherein the step of analyzing said audio user commands comprises the step of analyzing said audio user commands using a speaker-dependent voice recognition program.

36. The method of claim 31, wherein said step of accepting audio user commands comprises the step of receiving touch-tone signals dialed by said user on a telephone keypad.

37. The method of claim 31, wherein the step of producing audio messages comprises the step of generating a plurality of computer-generated voice messages spoken over telephone lines, the plurality of computer-generated messages including a plurality of menu selections for driving a plurality of command routines.

38. The method of claim 31, wherein the step of controlling a telephone switch and an audio response unit comprises the step of directing telephone calls through said telephone switch based on the responses given by a user to said audio messages.

39. The method of claim 31, further comprising the steps of:

obtaining spoken responses to certain ones of said audio messages;

comparing said spoken responses to stored samples of subscribers' voices; and

determining if said spoken responses match any one of said stored samples for identifying a user as a subscriber.

40. A telephone communications node comprising:

a telephone switch having at least one incoming line and at least one outgoing line for switching calls therebetween;

an audio response unit for receiving incoming audio communications and for generating and transmitting other audio communications; and

single control means for executing a stored program sequence based upon the incoming audio communications received by said audio response unit, said control means and said program sequence directly controlling both said audio response unit and said telephone switch such that, based on said incoming audio communications and said stored program sequence, a call received by the telephone communications node may be switched to an outgoing line directed to a number other than that which the subscriber originally called,

wherein said telephone switch includes a plurality of local network nodes, each having a plurality of incoming and outgoing telephone trunk lines, each of said local network nodes being connected to a regional network node,

and wherein said audio response unit and said single control means are part of said regional network node.

41. A telephone communication system, comprising:

at least two telephone communications nodes in accordance with claim 40; and

a central network control system connected to each of said regional network nodes, for controlling administrative functions associated with said telephone communication system.

42. The telephone communications node according to claim 40, wherein each of said local network nodes comprises a digital multiplexor.

43. The telephone communications node according to claim 40, further comprising optical fiber transmission facilities connecting each of said local network nodes to its respective region network node.

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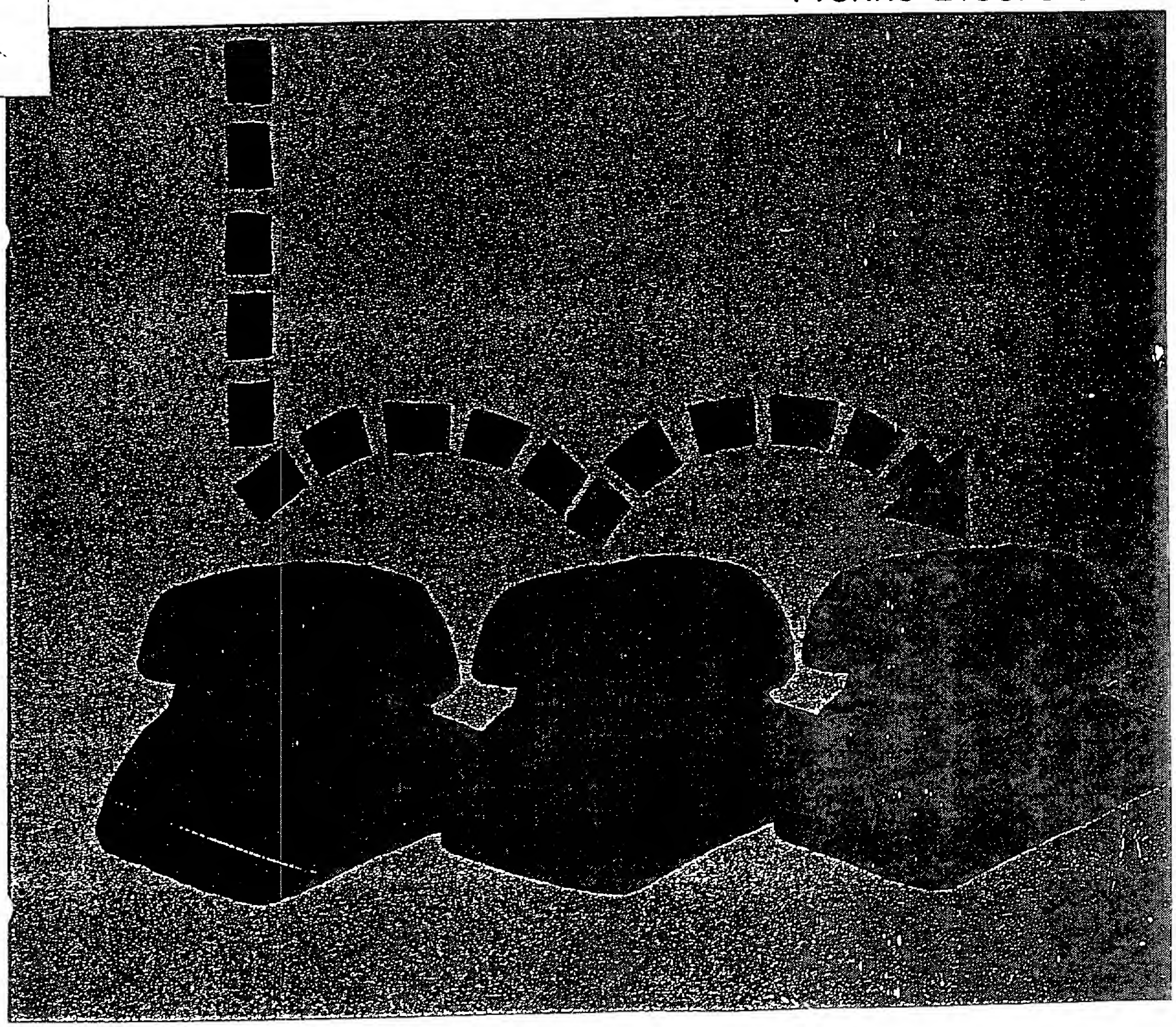
The Teleconnect Guide To Automatic Call Distributors

Steven C. Grant and
Yvonne Brooks Grant



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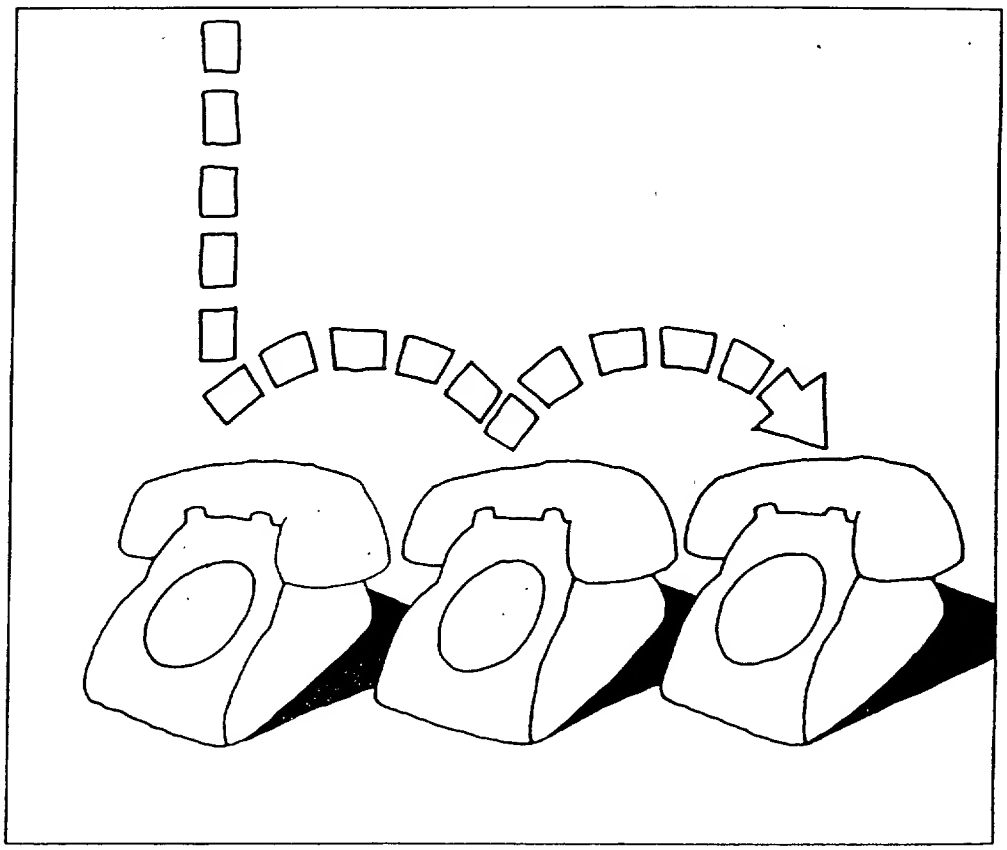

The Teleconnect Guide To Automatic Call Distributors

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A MANAGEMENT GUIDE TO AUTOMATIC CALL DISTRIBUTORS

Preface to the Second Edition

In the four years since publication of *A Management Guide to Automatic Call Distributors* both the importance and the sophistication of automatic call distributors have increased dramatically. The response to the first edition of this book is evidence of an accelerating trend. The numerous factual changes in the second edition and the expansion of technical detail in several chapters were necessitated by the evolution of a more knowledgeable and eager audience demanding an in-depth understanding of the current generation of equipment.

During this period the communications industry was radically altered by the Justice Department's imposition of divestiture and the increasingly *laissez faire* posture of the Federal Communications Commission. At the same time the telecommunications community is finally beginning to enjoy some of the technological innovations which have been common in data processing for the last five years. Divestiture brought with it not only tremendous confusion and a degradation of service levels; it also encouraged the release of communications technology which will change the basic capabilities of this industry.

Many of the forces set in motion over the last few years will ultimately result in greatly reduced communication expenses for businesses, along with a wide range of benefits to consumers.

The demand for sophisticated products in the ACD marketplace has driven the manufacturers to create new features and develop new products. Since the first ACD's were introduced, users have prodded and dragged the manufacturers to this marketplace. All of the data had suggested that the demand was too shallow to justify a major investment.

It is now obvious that the ACD marketplace itself is largely untapped. There are vast numbers of salesmen well-versed in the functional and economic advantages of key systems and PABX's who are discovering the opportunities for themselves and their customers offered by ACD's. There are still few salesmen who fully understand the ACD environment and sell the profit potential of these machines. In the future, the ACD will become as much a part of corporate information systems as the mainframe computer is today.

In recent months Northern Telecom has established itself as a viable competitor to Rockwell International for the large systems ACD marketplace. This is a market niche which Rockwell held unchallenged for over a decade. It is now wide open because of the growing perception that there is a very large and elastic demand curve for ACD functions. Teknekron, IBM-Rolm, and other manufacturers are developing advanced features which will make the current generation of ACD equipment obsolete and greatly increase the number of possible applications. Hopefully, this book will accelerate the cycle of change and improvement in ACD products.

This second edition is designed so that readers can choose the sections most applicable to solving their immediate problem--be it buying an ACD, staffing, or establishing performance parameters. The book is written with the telecommunications professional in mind and will not provide light reading for the interested amateur. Telecommunications as a discipline is now just as demanding as the data processing profession and requires a similar level of scientific knowledge and professional dedication. A telecommunications professional of ten years past may have been quite competent with a general knowledge of business goals. Now, however, that knowledge must be combined with skills in electronic engineering, mathematics, programming, and practical telephony. This book offers information about the fundamental skills required to operate an ACD center successfully, but it must be supplemented by the continued analysis and critical evaluation of the operating ACD itself.

Part I, the Introduction, outlines the elements which comprise an ACD and the diverse factors which influence its operation. Parts II and III should be used to assist a manager who is either buying a new ACD or re-evaluating the present system. In Part IV the elementary concepts needed for a technical analysis of the ACD in terms of its economic performance and traffic engineering are discussed. Service level definition is covered, as well as application of that service level to the problems of trunking and staffing. In addition, some consideration is given to multi-node ACD's and the problems of tandem trunking and overflow/interflow circuits. Part V applies the theoretical foundations of earlier sections to the actual operation of an ACD center. The organization of the system center, the staff management, and the agent operations are all considered as an extension of the performance parameters. The call-handling capability of the ACD is

discussed in Part VI; reports are covered in a detailed analysis of Administrative Data Systems and the essential reporting functions. Some elementary computer forecasting programs are offered that will run in BASIC on a desk-top microcomputer.

We want to thank the many intelligent and patient marketing representatives and technical advisors from the various vendors who assisted us in the publication of this work through their documents, questions, and suggestions. Our debt to a variety of authors is evident and their works are noted in the bibliography. Much credit should be given to the ACD managers around the country whose efforts continually improve our communications facilities.

We dedicate this book to a vital and vigorous industry and to our equally flourishing daughter, Yvette Elizabeth Grant.

Steven C. Grant
Yvonne Brooks Grant
January, 1985

A MANAGEMENT GUIDE TO AUTOMATIC CALL DISTRIBUTORS

PART I

INTRODUCTION

A MANAGEMENT GUIDE TO AUTOMATIC CALL DISTRIBUTORS

INTRODUCTION

The central philosophy behind this book is that an ACD must be managed in a fundamentally different style than any other communications device. Like all other communication services, the pivotal criterion by which to judge an ACD is the service level. Unlike these devices, the ACD can be managed with a service level rationally determined by the application of standard economic analyses. The service level in a PABX, or a tandem toll center, is basically determined by the psychological perception of the users.

With ACD's, since they are revenue-producing funnels for the flow of consumer information and services, it is possible to determine a scientific service level. This level is related to user perceptions, but is based on an economic analysis of the marginal productivity (or incremental profit) from any given level of blockage within the ACD center.

An ACD is more complicated to manage than other communication devices because its operation must be tuned in response to even short variations in staffing and call volumes. These fluctuations profoundly affect so many different aspects of an ACD-based business that it requires day-by-day, hour-by-hour analysis and management judgement in order to operate at an optimal level. It is never adequate to staff an ACD only for a peak period like a PABX, or to configure the number of trunks simply based on the average hours of highest traffic load like a tandem switch (not related to Tandem Computers). The ACD's proper role is not to offer any arbitrary service level selected at random, but to perform consistently at a service level which will generate profit or save money for the profit center.

This book defines the various aspects of an ACD center and provides the manager with a philosophy of management based on the unique requirements of these powerful and immensely profitable machines.

The Automatic Call Distributor (ACD) is the single most important cost-saving, revenue-producing communications tool available to the manager of an incoming call center.

The ACD is engineered to handle a large volume of incoming calls as efficiently and economically as possible. It is designed to answer calls efficiently by distributing the workload on an equitable basis throughout the agent staff. Whenever a modern ACD is installed, the speed, efficiency, and management control usually results in a twenty to forty percent increase in the productivity of the agent force and a ten- to twenty-second decrease in the average speed of answer.

These numbers translate into substantial savings and very short payback periods for the ACD investment. The current AT&T Communications WATS tariff costs around thirty cents per minute. The average value of the products sold in a telemarketing center can range from $ 15.00 to $50.00 per minute.

The ACD performs its functions more economically than any other device for three simple reasons.

1. A waiting queue is provided to increase the effective arrival rate of the incoming calls and allow more minutes of productive time for each agent and each telephone line.

2. The workload is automatically distributed among the work force to allow an equitable assignment of duties, which in turn facilitates greater productivity.

3. Comprehensive management reports are provided to allow control of the assignments, agents, and lines in a rational manner.

The ACD is the most complicated of any communications switch because it requires extensive reporting features and call-handling capabilities. The functional requirements of a PABX or a tandem switch are relatively simple compared to the Automatic Call Distributor.

The ACD is becoming increasingly important to the incoming call center manager.

1. It provides a cost-effective solution to the rising costs of consumer marketing.

2. It is a fully manageable utility which forces peripheral functions into a tightly controlled environment.

3. It is identifiable to upper management as a communications profit center.

The ACD has come of age as the center of the electronic shopping center. The incoming call center now combines the direct sale and voice referral capabilities of highly trained agents with the automatic interfaces of Audio Response Systems and Point-of-Sale devices.

The ACD stands at the helm of the telemarketing industry--complete with datalinks to computer systems which automatically flash the screen desired by the agent before the call arrives. Automated outbound marketing software dials a list of customer contacts for the agent, recognizes a human answer, and speeds up the distribution of calls. Specialized software installed by AT&T Communications and the Bell Operating Companies can now provide the agent with the WATS telephone number dialed by the caller.

Because of these technical enhancements and increasing sophistication in the management and operation of ACD centers, it is essential to consider the application of these devices in any business process which involves a large volume of incoming or outgoing calls.

The ACD requires in-depth management information resources to run properly. Manufacturers now provide reports to cover every possible detail most managers could desire. Typically the communications manager finds himself buried in paper with these machines. If a manager needs to know why the sales volume drops off every Tuesday at 1:30 in the afternoon, the information is right there--ten agents taking a break at the same time. If the manager needs to know why WATS costs are high and the number of calls answered are low--the reports clearly show that the number of agents is too low to handle the traffic being shuttled in.

The ACD's profit-making potential is so clearly recognizable that it provides the leverage for re-thinking the nature of communications expense allocation. The recognition of the ACD as a profit center means that money can be spent on the center in some sensible proportion to the dollars that the center generates.

The implementation of an ACD within the communications environment can do a great deal to start management thinking about telecommunications as a profit resource rather than an overhead expense.

This philosophy of communications management, that telecommunications is a profit-making tool for the efficient distribution and marketing of information, goods, and services, has guided the content of this book from beginning to end. Telecommunications is not merely an arcane field of technical specialization, although it certainly requires expertise. It is also a business function that must be managed and operated as an integral part of the marketing resources in the company.

An ACD can only perform efficiently with a precise definition of the business and communication goals it is expected to fulfill. In defining these goals it is not enough merely to study the current environment. The current environment is more likely than not sub-optimal in one or more respects. The ACD manager, or any business manager, must approach the ACD from a "hypothetical" design perspective.

It is not enough to measure the current profit margins from the switch center; the profit potential must be measured.

It is totally inadequate to measure the existing occupancy and productivity of the agent force and then manage to those standards. The development of productivity in the center must start from an analysis of the theoretical limits approached by a model center operating without the constraints of accepted practice. A ten-second speed of answer and thirty seconds of after-call work time may be the current norm--even though a zero-second speed of answer and no after-call work time may be easily achieved.

An efficient, well-tuned, and properly managed ACD will carry traffic at the optimal service level and the minimum cost.

Defining the optimal level and maintaining the ACD's operation at that level is the communication manager's task. This job requires insight into all the disparate elements of the ACD operation--from the electronic operation of the switch to the psychological motivation of the people answering the phones. This book should provide a substantial portion of the background information and general theory required to gain that insight.

The ACD may be a simple machine with 50 agents and a single switch, or it may be a three- to six-node network of ACD's with 200 to 600 agents at each

location. The level of complexity varies, but the basic operational principles can be mastered and applied to any system.

Three essential factors determine whether the ACD will operate at its higher performance level.

1. An efficient queue must be maintained, insuring the proper ratio of trunks to agents.

2. An equitable distribution of the workload must be achieved.

3. The trunks and agents should be configured to establish an optimal economic return for the ACD.

These basic factors are defined and analyzed throughout this book. An efficient queue implies that there be neither so few trunks that the agents are idle a great percentage of the time, nor that an excessive number of trunks present more traffic to the agents than they can answer within a reasonable period of time.

To attain equitable distribution of the workload, all agents must receive approximately the same number of calls. For greater answering efficiency, each group of agents should be as large as practicable.

The trunk and agent configuration should not be confused with the trunk to agent ratio. The trunk to agent ratio is concerned with the balance between trunks and agents. The configuration is concerned with the total number of trunks and agents in relation to the revenue generated or saved by each answered call. The optimal configuration is a result of a marginal productivity analysis on the trunks and agents.

In order to institute and successfully integrate these factors, the communications manager or whomever is responsible for the efficient operation of the center, must cooperate with a complex management structure. Figure I-1 outlines the levels of management responsibility which influence the ACD's operation.

Establishing an efficient ACD center is a job which requires power. Various management groups will attempt to define the ACD's operation. Whomever is to manage the ACD must have a clear conception of the ACD's required service level and general operation. Managers in the airlines industry are continually harassed by

FUNCTIONAL RESPONSBILITIES

Corporate Management

Capital Expenditure Approval

****

Administrative Management

Budget Preparation
Financial Accounting

****

Communications Management

Requirements Definition
Performance Parameters
Procurement
Network Management
Load-Balancing
Budget Preparation
Personnel Administration
Management Reporting

****

Profit Center Management and Supervisors

Configuration Control
Forecasting and Staffing
Trunking and Routing
Report Analysis
Equipment Operation
Training and Monitoring
Team Evaluation and Performance Reviews
Real-Time Supervision

****

Agents Agents Agents Agents Agents Agents Agents

Customer Interface Functions

Figure I-1

this lack of power. A typical operation may maintain divided authority over the ACD with communications management operating the switch while product management controls the budget. The communications department wages a continual tug-of-war to maintain adequate funding so that an optimal portion of the calling traffic can be handled.

Power in the corporate world is a complex derivative of budgets, influence, and information. To control the budget for the ACD is to control the machine. Total control is often not possible at some management levels, but it is a goal worth ambling toward. Information is simple to acquire and the ACD manager should understand every aspect of the machine. To speak forcefully about the proper operation of the communications center it is necessary to study the center thoroughly. Once this information is in hand, the manager's influence over the day-to-day operation of the switch can only increase.

The management groups will be competing throughout the fourteen steps listed in Figure I-2. These steps outline the required progression through the initial definition of the ACD to the final review process of an operating center. Each of these steps is discussed in detail in the following chapters, but a preliminary introduction helps explain the philosophy behind the management of an efficient ACD.

MANAGING AN EFFICIENT ACD

Requirements Definition
Long-Range Traffic Analysis
Budgetary Justification
Vendor Selection
Procurement
Site Preparation
Installation
Training
Cutover
Staffing
Operation
Forecasting
Network Definition
Performance Review

Figure I-2

The analysis must begin with a careful assessment of the ACD operating environment and functional requirements. An ACD center is a productive unit working with other revenue-producing units of a corporation. ACD's are divided into revenue centers and cost centers, depending upon whether calls generate revenue or request service information at a cost to the corporation.

An assessment of the ACD's operating environment should culminate in a document that outlines system requirements for the ACD. A comprehensive description of the manager's job should also be written. This should be an honest summary of the things you hope to accomplish and your position relative to those who may promote or hinder your goals. In many cases such an assessment will precede the selection of an updated ACD. A manager who can enter at this early juncture and assist with the initial study is then in a position to specify the operational requirements of the telephone center and the actual switch that should be purchased.

Once the parameters of the operating environment are defined, the manager should examine the performance criteria. An informal survey of managers around the country revealed that at most sites administrative managers above or beyond the communications functions were setting the performance criteria. Corporate performance criteria rarely have a rationale and rarely are based on a thorough economic and systems analysis of their effect on the operation of the ACD.

A complete effort at defining or redefining the operational requirements of the ACD, based on that initial analysis of the operating environment, is both a useful philosophical exercise for the manager and a quick way to save enormous amounts of lost revenue. The difference between management styles in the ACD center can mean the difference of several hundred thousand dollars per year in costs for equipment configurations, staffing, and trunking.

The day-to-day operations of the ACD center can be broken down into: instituting the performance factors in the system configuration, trunking requirements and staffing decisions, as well as the network configuration for multi-node ACD's; managing the physical plant and staff organization of the center--this includes hiring and firing, training, team assignment, equipment purchases, supervisory group definitions, monitoring and

quality control functions. As an adjunct to this effort, the reporting system must be considered for both internal and external forecasting and management reporting.

In short, the well-run ACD center must include the following:

1. An accurate definition of the ACD's operating environment.

2. An intelligent and closely analyzed set of performance parameters by which to judge the call-handling capability of the system, trunks, and agents.

3. A comprehensive administrative data system reporting structure and an equally comprehensive understanding of those reports.

4. An efficient management organization and a well-run staff of phone representatives.

5. A continual re-evaluation of the operating capabilities and economies of your present ACD and the ACD's of other vendors.

The final goal of the ACD manager is to achieve the stated performance parameters for the ACD center with the minimum number of agents and the minimum number of trunks at the optimal cost.

It is meaningless to say that the manager should achieve the requisite performance at the "lowest possible cost" because there are costs associated with any effort, including those resources of time and equipment used to lower costs. There must be a reasonable assessment of the cash flow derived from any cost-reduction effort. The costs of a forecasting analysis to reduce trunk usage may exceed, for example, the economies gained from dropping one or two trunks.

The rewards of efficient ACD operation are numerous. There are considerable economies that can be realized by thinking through the operation of the switch and cost-justifying the various service parameters. An efficient ACD should be able to handle short duration calls (around 45 to 60 seconds) for about thirty cents per call--including all of the machinery, agents, and trunks. There can be improvements in the satisfaction of the agent force and the telephone callers. Turnover among the agents and complaints from the customers can

be lowered substantially by such things as merit pay and efficient service levels.

Beyond this, we are in an exciting era for telecommunications. Managers who are well-versed in the present machinery can significantly affect the design and operation of the equipment they may work with in the future. There are not many communication managers who are fully cognizant of the wide variety of ACD equipment and features presently being manufactured. Those few with an understanding of this equipment and an eagerness to exploit the full potential of these machines have an unlimited future in communications.

PART II

BUYING AN ACD

CHAPTER ONE

WHO NEEDS ONE?

The answer to this question is very broad. Every corporation, company, and shop which answers incoming phone calls with a staff of agents or trained people is a potential candidate for the considerable cost savings and service benefits of an ACD.

With recent advances in technology and the increased number of machines marketed each year, ACD equipment has become very cost-effective. Even the large, sophisticated ACD's which cost $ 7,000 to $ 8,000 per line four years ago are available for less than $ 3,000 per installed position. It is now reasonable to assume that operations with as few as five people can be easily served with a call sequencer, groups of 35 to 150 agents can be optimized through the use of small, limited function ACD's, and centers above this can effectively use the very large and sophisticated switching systems provided by the half dozen major manufacturers in this marketplace.

The airlines were the first companies to use modern ACD's. The enormous volume of calls that were generated by the modern reservation systems necessitated a better way to handle the calling public. Mike Huntley, at that time Communications Manager for Continental Airlines, worked with Collins Radio Company (now a part of Rockwell International) to design, build, and install the first digital, interconnect ACD. Many of the other airlines followed Continental's lead and subsequently installed ACD's from Collins. The Collins device was faster, more reliable, and less costly than the mechanical devices the airlines previously used in their reservation centers. An immediate 10 to 30% increase in call-answering efficienty was obtained at many sites replacing mechanical ACD's. A number of other vendors, including AT&T, Datapoint (the ACD division is now owned by Teknekron), Northern Telecom, Rolm (now owned by IBM), and a large number of distributors for smaller machines, entered the market for computer-controlled ACD's in the following years and the range of companies using these devices has expanded considerably.

Following initial sales to the airlines, ACD's have

been installed in banks, insurance companies, government agencies, credit card services, cable television services, newspapers, utility companies, and nearly every industry that has a service or revenue function in an incoming call center.

An ACD, particularly a stored program-controlled ACD, is more efficient than a PABX for some applications because it eliminates much of the manual call answering, simplifies the transfer process, and provides a waiting queue to smooth out the random flow of incoming traffic. This allows fewer operators to answer more calls.

In a typical PABX installation there may be only one phone line for every twenty telephones installed. An ACD environment may run with 1.1 or 1.2 phone lines for every agent position installed. The traffic demands on an ACD are much greater than those on a PABX.

An incoming call to a PABX must first determine its target phone, ring that phone, wait for the called party to lift the receiver, and technically allow the conversation to commence.

In an ACD the incoming call is recognized by the switch, an available agent is selected by the computer to handle the call, the agent is given a short tone through the headphone as an alert, and the call is connected immediately. The agents are trained to say a standard greeting. No time is wasted ringing or picking up the telephone. The call is immediately placed at an answering position. If a transfer is necessary, it can usually be handled by dialing one to four digits and then releasing the call.

There are also transfers (sometimes known as blind gate transfers) which can be initiated that require no further involvement of the agent. This type of transfer allows the agent to dial four digits assigned to the ACD itself and release a call back into another part of the system without sending the call to a specific phone number or waiting for an answer before hanging up the call. These computer-controlled answering machines can save an incredible amount of money for a communications department.

To justify the installation of an ACD the answering function must be:

1. Anonymous.
2. Homogeneous.

These two characteristics determine whether an ACD or a PABX application is appropriate for an incoming call. A PABX, or a specialized PABX such as Centrex, assigns a unique phone number to each telephone. If a customer dials the PABX number of the Burjon Corporation, for example, that customer probably wants to talk with a specific individual and is dialing the person--not the company in general.

In an ACD application, the customer wants a service--not a specific individual. The customer may be calling the Burjon Corporation to purchase a replacement part or to request a serviceman for compressor maintenance. It does not matter who answers the call. The important thing is that the call be answered as quickly as possible, that the customer be allowed to wait in a logical fashion, and that the responsible personnel be notified by the phone representatives.

The calling traffic is considered homogeneous if anyone within a group of trained representatives can effectively handle the call. This homogeneity does not imply a requirement that only one type of call be answered at the ACD. Many operations are successful with two or three different types of calls hitting specially trained operators under heavy loads. It is necessary that the operators receive a steady flow of the various types of calls under these conditions. Without constant hourly exposure to that mix, the agent population loses the ability to answer various calls instinctively and quickly.

In a PABX or Centrex application the customer is calling because only a few individuals at that number can answer the question or provide the required service.

Many systems which are presently serviced by a PABX could be more effectively handled by an ACD. One corporation, for example, provided a dispatch function via a centrally located PABX for its nationwide network of vehicles. The system used incoming WATS lines and a bank of office telephones arranged in a pickup group to all ring on the same number. Drivers would call in and receive their assignments through the dispatch agents on the telephones. What this arrangement didn't provide was an automatic distribution of the workload among the telephone representatives. There were no reports on who was doing how much work. There was no delay queue for blocked calls. There were no trunk reports to determine the WATS usage and economy from each of the regions. In

short, there were long delays, inequitable workloads, no systematic management control, and no efficiency. An ACD was the obvious solution.

Other examples are less obvious. Another customer at a travel service had individual travel agents assigned to each account, and all of the agents handled the calls from the general public. It seemed like a good service and the customers became accustomed to dealing with one representative all of the time. Good rapport was established, and service was fairly efficient. In fact, the rapport was so good that the travel agents and their customers would chat about vacations, their families, and the weather while other customers were hearing busy signals.

The installation of an ACD in this environment proved that there was a lot more business out there beyond the pleasantries and busy signals. The customers were not displeased to be answered quickly and efficiently by a "Travel Tour Representative" instead of "Betty Eileen." The ACD reports also demonstrated that some of those calls were high-revenue calls and a great many were fishing expeditions. The establishment of separate gates (groups of answering positions assigned to specific functions) and specialized training allowed the phone representatives to understand their area better, give more efficient service, and concentrate on the high-revenue gates.

The concept of "gates" in an ACD is important because it is a feature which allows these machines to produce enormous revenues--just like the functions of queuing and equitable distribution. A gate (sometimes called a split or group) is a functional division within the ACD which allows incoming calls to be directed from a specific group of trunks to a specific group of agents.

If a caller in New York, for example, dials 1-800-515-4733 to reach a consumer complaint hotline in California, those digits will route the call across country to the central office serving that ACD. The last four digits will tell the central office to select any one trunk in a group of trunks which are terminated in an ACD gate that is staffed by operators trained to handle consumer complaints. That same ACD may have up to thirty different gates or answering groups, each with a separate phone number or with multiple phone numbers within each gate, to allow calls to be routed to people ith specialized training and information. This gives

the communications center the equivalent of "assembly line" specialization because each person can handle the task he or she understands best.

Any communications manager can improve an incoming call problem area by installing an ACD. The handling times typically drop by five to fifteen seconds per call. The number of phone representatives will drop by 5 to 10%. The trunking requirements will be reduced. The number of trunks out of service or idle will be substantially diminished because the ACD automatically checks each trunk throughout the day.

An incoming call center with 80% of its service over Foreign Exchange (FX) lines will run with 10 to 15% of its lines out of service during a given day without an ACD to assist in the monitoring. An outage rate of 2 to 5% is more typical with an ACD as a diagnostic tool. The performance of the phone representatives normally increases by a minimum of 20% over any other answering system.

The primary consideration in deciding if your department requires an ACD is the cost per call versus the cost of the equipment. The airlines produce about eighty dollars of revenue for every 1.7 calls answered. At this rate, an ACD is producing over a million dollars of revenue per month for each answering position. The cost/benefit ratio is quite high.

The retail industry is only now beginning to understand the potential cost savings which can be realized through ACD's because only now have ACD's reached a point where modern, low-cost electronic architectures will allow a reasonable payback period on a system with low-revenue traffic volumes. An expensive ACD with 120 to 150 answering positions may lease for $20,000 to $25,000 per month. The purchase price would be around $500,000. The less expensive switches (although no less in quality or functionality, so shop carefully) will run about $ 250,000 to $ 350,000 depending on the reporting options. The buyer usually wants about a twenty percent return on the money invested and a payback (profits or savings generated equal to the cost of the equipment) in less than three years. The retail industry has much lower revenues per call than an airline (about ten to twenty dollars in sales per call) and must maintain a high calling volume and low equipment costs to justify an ACD.

Who needs an ACD? Any operation which handles a constant volume of incoming call traffic can make money with an ACD. An ACD increases revenues and decreases the costs for incoming call centers. Every business with a function that fits the criteria outlined in this chapter should consider purchasing one of these machines.

JUSTIFYING AN ACD TO MANAGEMENT

Now you know you need one. Your staff knows you need one. Everyone agrees that the thing will save a pile of money, save your job and your company, but management is slow-rolling the approval. They are asking for justification.

Purchasing an ACD can require the persistence of Sisyphus. On most occasions it will necessitate rethinking the entire telephone communications operation. There will be management changes and staff changes. New jobs will be opened and old relics dusted out of their corners. The managers who successfully advocate the selection of an ACD are often putting their own jobs on the line. If the ACD fails, the manager is replaced. If the ACD is installed and successful, the manager has to work harder. Buying a piece of equipment which causes this many changes is never easy.

Management personnel cannot see the wisdom of your choice unless it is presented clearly, concisely, and in a language they can understand. That language is "money."

If the ACD provides a positive return at the bottom line, within the payback period specified by the company or at the opportunity cost rate required, the ACD will be accepted. There remains a considerable amount of juggling, particularly in a new application, to acquire the management attention and support to complete the project, but the approval of the purchase order is only the first of many steps.

The justification process has several stages. The first is a thorough study of the present communications service. Depending on the type of ACD purchased, it may be necessary to call on resources from other departments who will use the additional tandem and PABX functions that are collocated with the ACD. The overall communications budget should be presented first, followed by the portion of the budget that the ACD proposal is addressing.

An ACD installation will provide, or should provide, a number of incidental benefits that will assist in its justification to management. Although the ACD will generally handle only incoming calls on a single-node installation, most of the electronic ACD's offer some form of outcall route selection or least-cost routing package. This service can be sold to the Centrex or PABX subscribers to enhance their operations. The electronic ACD, if it is a replacement for a mechanical ACD or a new ACD replacing a PABX service function, will also bring a number of enhanced ACD features that provide economies in operation and improved service. All of these improvements, along with a chart of their costs and anticipated savings, should be noted during the presentation. These costs should be projected over the life cycle of the equipment and carried over into a cash flow statement.

The actual selection process should be explained. The management committee should be made aware of the differences between vendors and the reasons for the selection of a particular ACD. It would be disastrous not to have someone present who clearly understands the features and operation of the ACD. A consultant, or some extensive homework, is invaluable at this stage.

Top management personnel often rose to their present positions by ferreting out that one question no one knows how to answer and springing it like a steel-jawed trap around a struggling project. Usually an ACD is chosen on the basis of some trade-off between price and performance. Management will expect to know where these trade-offs were made and by what process the competition was eliminated. It may be helpful to use the present system as a starting point and explain the cost and/or feature differentials as compared to that standard. The list of features should also include such items as service, design, maintenance agreements, and expansion capabilities.

The estimated cost savings and the economies to be gained from a particular ACD and its features should be outlined at this point. Another essential topic to include in your presentation is an explanation of how the ACD fits into the overall and future communication eeds of the company.

CHAPTER TWO

KEY FEATURES

There are some features which are nice to have; others which are essential. The nice features depend on the application; the essential features are fundamental to any effective ACD operation, and a switch should not be purchased without them--unless the cost differential is significant.

The features available also vary depending on the size of the installation. ACD's can be roughly categorized into three groups as small, medium and large: in a small system there are 0 to 50 agents; 50 to 150 agents constitute a medium system; and any force of agents over 150 qualifies as a large system. These divisions are primarily economic, i.e. the manufacturers of large systems are generally not cost-effective below 150 positions, while the medium-sized systems are too expensive per position below 50 positions.

The essential items fall under the two basic categories of ACD operation:

1. Call-Handling Capabilities.
2. Administrative Data System Reporting Capabilities.

For call-handling capabilities the essential features are:

- Call Distribution--Uniform or Automatic
- Direct Outward Dialing
- System Interdialing
- Transfer, Hold, Conference
- Queuing and Intraflow
- Automatic Console Answering
- Emergency Alert
- Incoming Call Identification
- Night Service
- Delay Announcements
- Calls Waiting Indications
- Supervisor Assistance and Monitor
- Routing Facilities
- Outbound Telemarketing
- DNIS Interface

The distinction between uniform and automatic call distribution is important because the distribution scheme for calls within the ACD determines whether or not there will be an equitable distribution of the workload among the phone representatives.

Uniform distribution means that the ACD maintains a list of all the answering terminations in the system and distributes the traffic according to that list. When a call enters the switch, the computer will look down the list of available agents and give the call to the first phone on the list. The second call goes to the second phone and so forth. It may be that one phone further down the list has been idle longer than a phone at the head of the list, but the first phone will still receive the next call. The agents will be forced to work an unequal amount of time based on their position in this list.

Automatic call distribution eliminates this problem. Automatic distribution does not hunt down a list, it tracks the actual workload and diverts calls to the agents who have been idle the longest. This system is still not completely foolproof. Agents can beat this feature by setting themselves "unavailable" after each call rather than remaining in the available and idle state as they should. When agents reset their position to the available state they will have gained some additional time out of the call-answering process. Managers must carefully analyze the performance reports provided by the ACD to insure that agents are not artificially invoking features that provide excess time off.

Direct outward dialing allows callers to interface directly with the outside world through the regular telephone dialing plan. Callers in the ACD center can access the public telephone network without routing through an operator or a PABX.

System interdialing allows anyone within the ACD to dial any other position in the same ACD by keying a four-digit extension number.

Transfer, conference, and hold capabilities are essential for the smooth functioning of the supervisor assistance to agents and to pass customers to other answering positions in the ACD.

Queuing is the principal reason an ACD saves money. Because the flow of incoming traffic is random, a queue,

or waiting line, reduces the number of agents needed to handle a given average load of traffic. The queue averages out the random flow of traffic and decreases the peak traffic load by holding the callers until the traffic load lightens. The queue also insures the maximum work efficiency in the agent group by allowing the center to add slightly more lines than would be normally required in order to compensate for any delays in the telephone company's central office or toll office equipment.

In many switching centers there can be a four- to seven-second delay after a call is disconnected before the next call is sent down the line. This disconnect time is simply wasted money, unless additional lines are added to insure a steady flow of calls to the agents.

Intraflow is another aspect of queuing. Each gate in the ACD should have a queue and intraflow capability. This allows agents in multiple gates to handle calls for each other and increases the size of the waiting line. As traffic engineering indicates, these larger queues allow a greater intensity of calling traffic to be handled with fewer agents. The consoles should be capable of automatically and immediately sending or giving the calls to an agent without manual intervention. If agents are not required to manually answer calls, the handling times are significantly lowered. As a part of this function the agents should also be allowed to manually release or disconnect a call.

A system which automatically accepts and disconnects calls is too slow. The automatic disconnect can take as much as six seconds for each call and this additional time is billed against the ACD. The explanation for this slow disconnect time is found in AT&T's "Notes on the Network." In the event of a called party disconnect (one where the ACD agent hangs up first), the specification calls for the immediate connection of another call on the line after a 40 to 75 ms delay for the tone plant to be placed back in the circuit. In the event that the calling party disconnects first (that is, that the person dialing in hangs up before the agent disconnects) then the specifications call for a delay of greater than 6 seconds before placing another call on that line. This is a terrible waste of capacity and helps explain why a high abandonment rate at a center artificially increases the apparent traffic congestion at the center. Agents must send the release signal to the central office

before the calling party is able to hang up the phone. Each "Thank You, Goodbye." should be punctuated by a quick stab at the console release button.

The call-handling features include those capabilities which allow the system supervisor to enter configuration control commands at the ACD. These commands allow dynamic reconfiguration of the ACD to meet changing traffic loads. The system supervisor should be able to add, move, alter, and drop agents, as well as PABX consoles and trunks, in the system. The supervisor should also have access to the routing commands and the class of service assignments.

Emergency alert is critical for any large business that is subject to occasional harassment by bomb threats or obscene phone calls. The emergency alert function will allow the phone representatives to connect a recording device into their conversation and obtain a record of the trunk on which the call was placed.

Incoming call identification alerts the answering agents as to the type of call they are handling. Typically a short message will be assigned to each incoming group of trunks and the operator will hear that message (for instance: "Miami") just before the call is connected to the telephone.

Rather than announcing the message through the headphones, there are ACD's available which display this information on an LED readout at the agent's console. This is a superior method for most situations because it avoids the one-second delay introduced by the announcement before a call is connected. There is also a much more positive recognition of the actual trunk group used if the agent can refer to the display throughout the conversation. With the appropriate software and the installation of DID InWATS, this display can also be used to show the actual phone number dialed by the calling party. This allows the call to be handled with any special information or greetings which are relevant to customers from a specific area.

Night service provides a recorded message to callers who attempt to reach the ACD after regular business hours. Instead of simply turning off the machinery and letting callers hear ringing, the ACD will connect the call to a message which relays the business hours or another number for emergency service.

Another function of night service is to transfer

all the incoming calls into one set of answering positions. This allows the ACD to keep just a few positions open and still answer calls from all the different gates. Night service can be used in either fashion, a recording or a transfer function, but it is essential to provide professional service.

Delay announcements are important money-saving features which help keep the queue working in an efficient manner. Since telephone traffic is random, there will be occasional bursts of traffic in any well-configured ACD. These increases in traffic volume force callers to wait for service longer than they would like. The delay announcer breaks into the line and cheerily informs the caller, "Our operators are temporarily busy. Please remain on the line and a representative will assist you shortly." Without this announcement most people will hang up after five or six rings.

The delay announcer also allows some savings on WATS charges. If the delay announcer is set to break in after six rings, there will be no charges on the WATS line during the ring cycle until the announcer cuts in. The delay announcer knows if there are agents available to answer calls and will hold callers in the ring cycle (up to a selectable maximum time) until an agent is available or until the selectable delay time is reached.

The calls waiting indication prods the phone operators to complete their present call more quickly and answer the backlogged calls. The calls waiting indication is usually a lamp on the console which will light whenever there are calls waiting to be answered. Many ACD's offer selectable settings on the lamps so that the indicators will flash at different rates depending on the number of calls backed up in the queue.

Supervisor assistance and monitoring capabilities are needed to provide expert advice to operators on difficult calls and when permissible, silently listen to agent-customer conversations to insure polite and efficient service. The assistance function should allow operators to request help without interrupting the call in progress (that is, they should not have to place the caller on hold to alert their supervisor); it should allow a supervisor to monitor the call before interrupting. The operator should also be able to place a call on hold when desired and confer with the supervisor privately.

The monitor capability is controversial. Some

unions and state laws will not allow a silent monitor. This feature is essential if good service is to be maintained. Without monitoring capabilities, the telephone offers such complete anonymity that an agent may yield to unprofessional temptations. We know that the customer is not always right, but there's no sense letting the customer know.

The outbound telemarketing function in an ACD is a relatively new application that was first developed by Rockwell International for the Internal Revenue Service and is under development by at least two other ACD manufacturers.

The telemarketing feature combines a software process that manages telephone number lists with an autodialer attached to the ACD. The early versions of this feature merely presented a list of telephone numbers at the agents CRT screen, then automatically dialed the numbers selected by the agent. The more sophisticated packages currently under development will operate independently of the agent. The machine will dial a list of numbers, and voice detection equipment will determine whether the call reached a busy signal, a ring no answer condition, or a person saying "Hello." Before the person is more than a few milliseconds into the "Hello" the ACD will transfer the call back to a waiting operator along with a canned script at the CRT that lists the contact's name and the product sales script.

The most conservative estimates for a telemarketing package indicate that this intelligent dialing function should save 30% of the agent labor expenses by reducing the non-productive time that agents spend dialing bad numbers.

The DNIS (or Dialed Number Identification Service) interface is also relatively new and was originally developed by Northern Telecom. This feature uses the DID InWATS service from AT&T and allows the number dialed by the remote caller to be displayed at the agent's console before the call is answered. The DNIS feature allows a telemarketing organization to advertise multiple telephone numbers in a city. The response generated by each advertising channel is measured by counting the calls taken on each different 800 number within that city.

REPORTING PACKAGES

The essential reporting features are outlined below. The reporting package is one of the most important reasons for buying a modern ACD. Without detailed, comprehensive, and accurate reports, the ACD will never operate at peak efficiency. The reporting package in an ACD takes the guesswork out of managing the machine. There will be a detailed breakdown of the amount of traffic, the efficiency or deficiency in the agents' answering abilities, and a complete set of trouble reports. From there it is a matter of understanding, interpreting, and applying the results of the reports to improve the operation of the switch.

- System Reports
- Agent Information Group Reports
- Delayed Call Records
- Trunk Reports
- Trouble Reports
- Overflow/Diversion Reports
- Network Reports
- Billing Records
- Call Records
- Agent Performance Reports

There are several major divisions within the reporting structure which should be available to effectively utilize the information gathered by the ACD.

System reports are the most general category and contain the statistics at the gate, or split, level. These statistics highlight the interface between trunks from the outside world and the answering efficiency of the operator or agent groups. These system reports usually appear as real-time displays on a CRT screen at the supervisor's desk and also as printed reports. These printed reports are shown every half hour throughout the day and again at the end of the day in summary figures. The system reports will show the amount of incoming call traffic, the number of agents available to handle that traffic, and some summary fields about the efficiency of that answering procedure: average speed of answer, service level, length of delay in queue, and miscellaneous fields about outcalls and outcall talking time. The system reports are the essential summary of the quality of service that the outside world is receiving from the ACD center.

The next major division in an ACD's reporting package summarizes the call-handling activity of agent

information groups. The agent information group reports are valuable for comparing different groups of agents within one gate or split. The information group reports allow any number of agents within a gate to be isolated in a smaller subset of the gate. For instance, this allows the system manager to place all college graduates within one group and all high school graduates within another group. These two groups can be compared to determine the relative advantages of hiring based on education levels.

The information groups are also helpful because they can be used to assign a group of agents to each supervisor or team leader. The performance of individuals under a specific manager can then be determined. This allows the supervisors to implement additional training or staffing based on each group's performance in relation to other groups. The basic distinction between the information groups and the system reports is this ability to bracket groups of people within subsets of the answering gate and compare their performance.

The delayed call profile reports are used to determine the length of the delay queue and the length of time that people are willing to wait before they abandon their call. These reports are displayed in several different forms depending on the ACD purchased, but all of them show the number or percentage of callers who waited a given period of time before their call was answered or before they abandoned the call. The delayed call spectrum times delays over five-second intervals, from zero seconds to several minutes. This information is invaluable for determining how many agents to place on the phones. If customers are willing to hang on the phone a very long time, the service level can be degraded to match this tolerance.

The trunk reports are the primary traffic engineering tool for the ACD. A few ACD's offer a built-in trunk forecasting package. All the modern ACD's provide some reports of this type which assist in determining the blockage (how many calls are being held) and level of service on the incoming trunks.

Agents and trunks are the major expenses in an ACD center. The trunk reports are necessary to insure that these valuable facilities are operating in an efficient manner. For any number of reasons trunks are prone to failure. FX circuits in particular are likely to be out of service as much as 10% of the time during a given

month. The implementation of an ACD with advanced trunk reports will usually reveal that twenty to thirty percent of the trunks connected to the old machine were faulty. Twenty to thirty percent of the lines were connected, paid for, and generating no revenue in return.

Any factory which did a head count and suddenly discovered thirty percent of its workers were dead--merely propped up in their chairs--would be justified in expecting a productivity increase along with some new management. The trunk reports on the modern ACD's provide a sophisticated form of electronic management in this area. No longer is it necessary to rely on the simple peg counts that are typical of older, mechanical ACD's. Peg counts are now just one of many trunk reports found in the newer ACD's. The reports will also show the number of calls offered, handled, and abandoned, along with the trunk holding time and the percentage of time that all trunks in a group were filled with traffic. With these reports traffic engineering becomes less a matter of complicated formulas and tables and more a matter of intelligently interpreting the hard data.

Trouble reports are simply maintenance aids which allow the ACD to communicate its problems. If there are errors in the software, or the hardware malfunctions, then these trouble reports are sent to a monitor screen or a printer to alert the operators and maintenance staff.

Overflow/diversion reports are only required if this feature is provided on the ACD. The more sophisticated ACD networks with multiple-node ACD's around the country use this feature to share the call-load among all the ACD's in the network. The reports show clearly how much traffic each ACD is feeding to another. The problem with diverting calls is that managers typically do not want to do work for which they are not rewarded. Unless the reports show clearly how much traffic each manager is shipping to the others, they will play a negative-sum game where each manager degrades the service level to force a distant switch to handle his traffic. The manager who can do this successfully appears to be a winner. Of course the customers suffer because the service levels are degraded at all of the sites, while their calls chase each other around the network in search of a center with the kindness--or the service level--to take them in.

Network reports are similar to overflow/diversion reports. This feature is not implemented in every ACD. When the ACD is used as a private long distance toll network, the reports should clearly show how much traffic is being routed around the network.

Billing records and call records are also important in a communications management environment seeking to control costs. Many ACD's are capable of collecting the same type of SMDR information (Station Message Detail Recording) about time and duration of individual calls that PABX's currently gather. These individual records are useful for billing long distance charges and system usage back to individual departments. Often simply making people aware of their calling patterns tends to decrease the usage of toll facilities.

The agent performance reports are a special category available on many ACD's. Agent performance allows the system manager to assign an individual agent identification number for every agent in the system and the computer will then track the performance of individual agents throughout the day--no matter which console or telephone they use. The agent performance identification number gives the supervisor total freedom to move agents about the center without worrying about altering the validity of the group or system reports.

This section only provides a brief outline of the features which should appear in an ACD. The ACD, like the PABX, has become so complicated that only a detailed analysis of each particular site's communication function will indicate which of the possible features are needed.

CHAPTER THREE

TECHNICAL CONSIDERATIONS

There are some basic technical questions which must be asked and answered during the ACD selection process. Buying an ACD is, in some respects, much like buying a modern stereo. There are any number of distinct operating philosophies and general differences; there are an even greater number of indistinct technical differences.

In the final analysis, the day-to-day reliable operation of the ACD is more important than any rarified engineering arguments about relays, PCM, PAM, TDM, and SDM.

This day-to-day operation is guaranteed more by the manufacturer's reputation and the documented history of the installed base than by a four-inch proposal with envelope delay distortions and harmonic imbalances spelled out to the umpteenth decimal point.

A contract with specific penalties for non-performance is the only accurate gauge of the vendor's private confidence level. As specified in the chapter on contracts, the vendor should be willing to pay specific sums of money for the failure of any aspect of the equipment. AT&T provides rebates to customers when a line is inoperative beyond a specified number of minutes. The ACD manufacturer should be willing to pay for downtime on the equipment and provide rebates for slow repair service. It will usually be a battle to get these guarantees, but the fight will be worth the rewards.

Nevertheless, there are differences in the design and operation of the various ACD's on the market--differences which may be insignificant today, but perhaps devastating tomorrow when the switch is expanded or made part of a more sophisticated network.

The technology of the future, the technology which will allow the greatest potential for economic growth and sophisticated performance, is the stored program-controlled, fully digital, time-space-time switching matrix, T-1 compatible, electronic ACD. Such an ACD is

not the only available alternative. The analog switches will transmit data up to 9600 baud as readily as the digital switches, although the analog switches are not able to reach the kilobit per second rates possible with digital signals. The mechanical ACD's still answer calls and perform a basic set of functions. However, the fully digital ACD's are the best answer to the widest range of communication problems, particularly in the large system sizes.

The cost of these devices is dropping dramatically. A price war of sorts is just beginning in the ACD marketplace. For the last several years PABX manufacturers have been attempting to garner market share by competing on price. The ACD is finally reaching a size where similar attempts to gain market share will start. AT&T and Rockwell International held price umbrellas over this marketplace in the past, but they are going to be forced to compete aggressively on price as IBM-Rolm and Northern Telecom try to capture the market share.

The smaller ACD's typically employ a micro-reed relay switching matrix because this is a less expensive solution for the smaller line sizes. These switches also consume slightly less power than the digital switches, although the increasing use of CMOS components and high density cards in the digital switches is erasing this advantage. The relay matrix becomes impractical at larger line sizes, and the economies possible in small switches diminish as they approach the line sizes of the digital models.

A digital signal is a series of discrete pulses with the electrical current alternating rapidly between high and low states. An analog signal does not display distinct steps, or levels, and amplitude of the analog current varies smoothly like a wave or maintains the steady voltage of DC (direct current). Either analog or digital signalling can be used to accomplish most tasks in telephony, but the digital method has distinct advantages.

Digital signals provide greater resolution and accuracy than analog signals. Each portion of a telephone conversation carried on a digital circuit is sent down the line as a mathematical representation of the spoken sounds. The discrete on and off pulses in the digital signal represent numbers, which represent the analog sound of the actual speech. Once those numbers are copied into the carrier signal there is much

less chance for distortion.

With the digital signal the problem of circuit distances is almost eliminated. The digital signal can be regenerated at several points in the transmission circuit and the signal will be reproduced exactly at each point. An analog switching system amplifies the line noise whenever the signal is amplified and induces distortion.

The multiplexing capability of digital signals, weaving several channels together on a single voice line, allows the transmission of twenty-four voice channels on each telephone line. The digital signal can use its mathematical encoding to represent almost any dynamic range, as opposed to the limited reproductive ability of common analog circuits. The digital signal also resists transmission corruption because the discrete pulses are not as vulnerable to the component specification changes which accompany operation in a hostile environment. Exposure to heat, moisture, and electrical fields will adversely affect the operation of an analog circuit more than a digital signal.

The design of digital equipment allows for greater control and intelligence in the operation of the switching device. The operation of the switch, as it is manipulated by the computer controller, can be monitored. The service lines for a digital switch can be used for a wide range of purposes. The same digital channel can carry data and visual signals, as well as voice signals.

In order for a voice communication to travel over a circuit, into a digital switch, and back over another line to the called party, there must be several conversions from analog voice signals to digital signals. On an all-digital network, with each switch in the network operating on digital transmission and switching principles, there would be a considerable reduction in the network's cost.

The current telephone network requires that a digital ACD convert the switched digital voice channels back to analog signals before they can be transmitted over most portions of the telephone network. Every time this conversion is made, the associated equipment to perform this function must be installed. With an all-digital network, the analog to voice conversion would only be done at the individual's telephone. This would eliminate a great deal of costly equipment and improve the overall transmission quality of the network.

Not everyone, however, agrees on the transmission standard which will be implemented in the all-digital network. The European standard for digital transmission is different from the American. Most equipment vendors now have the T-1 standard available for their switches and are compatible with direct links to a digital central office.

With the introduction of AT&T's high capacity digital services at T-1 rates, the use of direct digital connections to the central office and the toll switching office will become a standard practice. The T-Carrier services offered by AT&T Communications are dramatically less expensive than equivalent analog channels and should be used as FX replacements wherever there is sufficient traffic volume.

Digital switching is the technology of the future and will be the basis, in one form or another, for all of the digital public telephone network. The cost economies and expanded capabilities introduced by a digital switching matrix with computer control will make digital switches the standard equipment of the not-so-distant future.

Undoubtedly, the mechanical switches and the non-digital, stored program control switches will be able to interface with this digital network, but they will require additional expensive equipment to accomplish this function. Also, their features may not be fully compatible with the rest of the digital network.

In order to evaluate the technology in the switch used by a given vendor, it is necessary to acquire a fairly extensive education from the vendor, the engineering documents, and system practices. Sometimes this evaluation will not be necessary because of the vendor's reputation or the contractual relationship with the vendor. However, if a new entry to the marketplace is being evaluated, or the switch is for a very expensive or sensitive project, then it is mandatory to understand the architecture, software, electronics, service, and operation of the switch before any purchase is made.

The following discussion will just touch briefly on some of the key points that should be examined. The actual analysis should be performed by the user to insure that a full understanding of the switch is obtained.

The basic components of an ACD include:

1. the distribution frame which interconnects the switch with the telephone lines;

2. the peripheral equipment section which controls the operation of the lines, telephones, and any auxilliary equipment;

3. the common equipment section which controls the actual switching of calls through the digital matrix;

4. the power equipment section which provides power to the switch and the attached devices; and

5. the software which actually drives the functions in the switch.

Most of these sections consist of cabinets or frames with a modular construction of backplanes and shelves that allow equipment to be plugged into the cabinets as the switch grows. It is important to check the switch for its growth capabilities. Many older style architectures required that entire cabinets or processors be replaced as the switch expanded even modest amounts. Most of the modern ACD's will allow growth in the range of a 1,000 lines just by adding shelves and cabinets without any significant changes in the processor architecture of the switch configuration.

The shelves in the cabinets are typically filled with printed circuits cards that determine which functions are supplied and which features are supported.

These printed circuits cards should be interchangeable wherever possible and of rugged construction for easy replacement. The best option is to allow the insertion or removal of cards without powering down the switch itself, or with only the affected shelf powered down. The trunk cards and station cards should be interchangeable on a given shelf or within a cabinet. This should eliminate the need for buying another cabinet when a switch, for example, requires an unusual amount of trunking and station card slots are empty.

The common equipment section of a switch typically provides the processor, memory, switching systems, conference circuits, digit transmitters, tone supplies, software magnetic tape unit, and control CRT or TTY

interfaces. These functions serve all the activities and callers on the switch and are central to the operation of the switch.

The common equipment section communicates with the peripheral equipment over an internal communications link known as a system bus or loop. The system bus or loop is one of the key limiting factors in any switch architecture because this electrical interface determines the amount of information that can flow between the peripheral trunk or station cards and the central processor.

The implementation of this system bus is one of the principal differences between early PABX's and ACD's and the current or "next" generation voice/data ACD's. The effective bandwidth of this bus (which determines the amount of information that can be transferred within a given time period) controls the number of trunks and stations that can be served on a given switch, as well as the speed with which data can be transferred through the switch.

The early Rockwell Galaxy switch provided a non-blocking architecture which guaranteed 32 CCS of traffic-carrying capacity to each trunk connection. This meant that there was never any possibility of failing to answer a ringing trunk. It also meant that switches which were not generating 32 CCS of activity per trunk were engineered for capacity which was not used.

The PABX manufacturers, such as IBM-Rolm and Northern Telecom, who have entered the ACD field take a different approach. They engineer greater capacity as it is needed by adding cards (network loops in Northern's terminology) which increase the effective traffic-carrying capacity of the switch. This feature allows those vendors to supply only as much capacity as is needed, yet still appear to be non-blocking at any given traffic level for which the switch is engineered.

The fact that these switches have to be "engineered" means that when evaluating a new entry to the marketplace the communications manager or analyst should have a detailed understanding of that engineering process. This understanding will insure that an adequate amount of traffic-carrying capacity is available for the number of stations and trunks that will be attached to the switch. An SL-1 switch from Northern Telecom consists of network loops or multiplex

loops which operate at 2.048 Mb/s and support 160 PABX stations per loop. In an ACD environment the number of agent consoles per loop is substantially less.

These network loops allow the common equipment to communicate with the peripheral equipment. Any incoming calls are answered in analog form by the trunk cards, digitized by the peripheral equipment,and sent to the common equipment for processing. The common equipment receives the digitized signalling information and voice streams and routes that call back to the proper agent console or outgoing trunk.

In the larger ACD systems most of the equipment in the common equipment cabinet will either be redundant or capable of redundancy as ordered by the customer.

For the evaluation of a new switch it is important to understand the configuration of the common equipment, how the processor and the peripheral equipment interact, and the manner in which failures and software changes are accounted for in the switch.

The main memory on the CPU should be redundant and error correcting with appropriate alarms in the event of any failures. The CPU and main memory reload procedure should be fast and effective as an electrical outage will erase any routing information from the CPU.

The peripheral equipment should include all of the common trunk types that will be used in the center.

CHAPTER FOUR

USING AND ABUSING CONSULTANTS

Consultants can be an invaluable aid if they are competent and honest. These characteristics, however, do not miraculously materialize just because a marketing walkout or disgruntled engineer hangs out a consultant's shingle. Consultants are most comfortable with what they know best. Consequently, a lot of consultants will recommend the same vendor's equipment time and time again, no matter how absurd the application and the fit.

Consultants, like the rest of humanity, dislike it when their cars run out of gas or their condo payments fall behind. Everyone has participated in head-to-head sales competitions where the consultant was either completely ignorant or paid off by one of the vendors. Some consultants will work on the basis of a percentage kickback from the vendor or they will recommend certain vendors with the understanding that their organization will receive the training, system design, or installation contract.

There is no foolproof way to determine that a consultant is honest, although one should make the effort. If the communications staff is totally unequipped to make the design and purchase decision themselves, they should consider hiring a permanent staff member to educate them. If the job is small enough to warrant a consultant, or specialized enough (like a network installation), some detective work should be done before choosing the consultant.

Check the consultant's credentials. Obtain a list of clients and interview those people to determine what the consultant did and didn't do for them. This procedure is the same that should be followed in checking out a vendor. Neither consultants nor vendors should be indiscriminately believed--only contracts and working examples have the solid feel of credibility.

The consultant's work record should include awards to a variety of companies unless some vendor is offering a clearly superior product--in which case you could have chosen it yourself. Again, if a consultant is choosing only one vendor, the ties may be too close for objective consulting.

Never choose a consultant recommended by a salesman. If the salesman recommends two or three companies and suggests you give them a call that is one thing; but if the salesman says, "Contact John over at 314-4526," then start looking in the Yellow Pages. The consultant should provide a written contract that there is no conflict of interest and that there is no compensation from any vendor.

The consultant should serve as an aid. He should not take the place of an informed decision by the communications manager. The final proposal, the vendor interviews, the site examinations, and the price quotations should be the result of a joint effort with the consultant. The consultant should not monopolize the information sources and then hand down a final decision.

This same warning applies to studies done by AT&T or any other company for your application. Both groups will offer free system analysis services as part of the sales pitch. These are an invaluable source of information, but they should always be carefully reviewed and fully understood. In many cases the free services offered by vendors may eliminate the need for a consultant.

The consultant should spell out, in detail, the fees which will be charged and the services which will be performed. A contingency fee based on the savings produced should not be accepted. Any job can be done quicker and with cheaper materials. The consultant should work for a flat fee and at a rate that is justified by services rendered.

Choosing an ACD is not that difficult. Most of the major ACD vendors on the market today provide competent, manageable ACD service. Some are better or worse; some are more costly or less expensive. The critical factor is selecting an ACD which fits the corporation's projected growth patterns and special needs.

The really challenging task is making the ACD, whichever one is selected, work at the optimal level. In the ACD arena, a consultant who can say how to install, maintain, and manage the ACD is more valuable than one who can tell you which vendor to select. The ACD consultant should be able to provide a complete range of analysis functions and management suggestions

CHAPTER FIVE

WRITING THE PROPOSAL

Countless one-million to ten-million dollar ACD's have been purchased by one member of the communications staff listening to the sales pitch of each vendor, studying the literature, and picking the winner.

In other cases a cast of hundreds has spent thousands, writing proposals, investigating sites, traveling to meetings, traveling to meetings about the previous meeting, and generally looking into every detail short of sitting down in each factory and soldering the ACD together themselves. Unless the system is very large and very special, a formal proposal and such intensive involvement may be unnecessary. A communications manager would have to know a great deal, that is, at least should have worked for a vendor at some time, in order to ask all the right questions.

The one thing the purchasing team should know is exactly what functions they want the ACD to perform. This should not take the form of a closed description. Such descriptions, often included in a Request for Proposal, may lock the buyer out of a better solution. The ACD may provide an answer to a communications problem that doesn't even resemble the question. The greatest weakness in a formal proposal is that each vendor may respond with everything the department wants, but never reveal the other things they didn't know enough to want. The best approach is to completely understand the present communications system and then bring in the salesmen to explain where the ACD fits.

AT&T marketing teams have been particularly good at this. They will hold a two-day session at the customer's site, learn their operation, and then explain where the ACD fits into that operation. Of course, the other vendors should be allowed the same opportunity because they might fit just as well--for twenty percent less. A proposal can save money and investigative time by eliminating the clearly inferior or ill-suited vendors, but a quick examination of their literature may accomplish the same results. The terminology differences among ACD's are so great that responses to proposals may only provide the vaguest idea of who can do what.

A sound approach is to invite each vendor in to explain the capabilities of his or her ACD, visit a working (in a business environment) site, and make a lot of telephone calls to check out each company's reputation and quality. Now, if you still want to write and submit a Request for Proposal, there are some things to include.

Do not allow any manufacturer to bid a paper tiger. If the vendor is known and trusted, it is fine to engage in some joint development efforts. However, it is not an uncommon ploy for manufacturers to push other vendors out of the running by bidding features not currently installed and offering a "budgetary" price on those features. A budgetary price should never be accepted in a contract. Accept only fixed prices. There should be penalties attached for failure to deliver and failure to meet the specifications.

SAMPLE PROPOSAL OUTLINE

1. INTRODUCTION

2. VENDOR INSTRUCTIONS
   - 2.1 General Instructions
   - 2.2 Proposal Organization

3. FUNCTIONAL SPECIFICATION
   - 3.1 System Configuration
     - 3.1.1 Hardware Description
       - 3.1.1.1 Floor Plans and Environment
       - 3.1.1.2 Matrix Description
     - 3.1.2 Software Description
     - 3.1.3 Signalling Interfaces
     - 3.1.4 Generic Release Schedule
     - 3.1.5 Configuration Control Capabilities
   - 3.2 Call-Handling Capabilities
     - 3.2.1 Call-Per-Second Capacity
     - 3.2.2 Uniform or Automatic Distribution
     - 3.2.3 Standard Features
     - 3.2.4 Optional Features
     - 3.2.5 System Limitations (Nodes, Lines, etc.)
     - 3.2.6 Trunk/Line/Agent/PBX Mixes
   - 3.3 Reporting Capabilities
     - 3.3.1 Real-Time Reports
     - 3.3.2 Printed Reports
     - 3.3.3 Complete Report Descriptions

- 3.4 Network Capabilities
  - 3.4.1 T-1 Compatibility
  - 3.4.2 Network Interfaces
  - 3.4.3 Numbering Plan
  - 3.4.4 Routing Structure
  - 3.4.5 Maximum Nodes
  - 3.4.6 Network Control Center
  - 3.4.7 Loss Plan and Network Analysis Services
- 3.5 Expansion Capability

4. TRAINING SERVICES
   - 4.1 Supervisor Courses
   - 4.2 Agent Courses
   - 4.3 Maintenance Courses
   - 4.4 General Courses

5. MAINTENANCE AGREEMENT
   - 5.1 Maintenance Response Time
   - 5.2 Optional Maintenance Contracts
   - 5.3 Remote Diagnostic Capabilities
   - 5.4 Service Depot Locations
   - 5.5 Spare Parts List
   - 5.6 Preventive Maintenance Calendar
   - 5.7 Maintenance Charges
   - 5.8 Self-Maintenance Support
   - 5.9 Estimated Life Cycle Maintenance Charges
   - 5.10 Documentation and Update Service
   - 5.11 Warranty
     - 5.11.1 Hardware
     - 5.11.2 Software
   - 5.12 Ongoing Software Support
   - 5.13 Vendor or Distributor Maintenance

6 PRICING
   - 6.1 Itemized Feature and Option Prices
   - 6.2 Installation Prices
   - 6.3 Estimated Operating Expenses
   - 6.4 Lease, Rent, and Purchase Cash Flow Analysis
   - 6.5 Sample Moves, Changes, and Addition Charges

7. INSTALLATION AND CUTOVER
   - 7.1 Installation Schedule
   - 7.2 Acceptance Test and Diagnostics
   - 7.3 Cutover Plan
   - 7.4 Cutover Support (Hardware & Software)

8. REQUIRED FEATURES
   - 8.1 Essential Capabilities
   - 8.2 Present System Configuration and Operation

This outline should keep the vendor's marketing department tearing their hair for a few days and supply the purchaser with some useful information. The general philosophy of this outline is to allow each vendor to state what is available, not to demand x, y, and z snappy features from the vendor. There is more to be learned by a general "how does it work" question and answer proposal.

The information accumulated should be arranged in a matrix to compare each vendor, with points assigned to each feature as weighed against the price. The essential thing to keep in mind is that price is not really the object: performance is of principal importance. Almost any PABX will offer so many bells and whistles that no one can take advantage of them. In an ACD all those special features will be used every day and can make the difference between an effective traffic flow and a bottleneck.

The prices should include everything needed to move the ACD from the manufacturer's factory up to the turnkey installation. Nothing should be extra or additional unless it is clearly spelled out. Once all of this has been accomplished and a vendor is selected, some additional items should be added to the outline. A more complete cutover and installation plan are necessary, along with some guarantees, but the contract will provide for that.

Once the proposal response is received from the vendor, it is important to evaluate that response in the proper context. The principal source of information is the sales representative serving your account and a word of warning is required in handling this relationship.

Most sales-oriented people are bright, well-informed, highly motivated, willing to take risks, and hungry. Hungry is the key word. Nothing they say should be believed. Nothing anyone says should be believed if it isn't written down in a contract with specific penalties attached. The features of an electronic ACD are so advanced that no one can understand all of them. Usually it will take a group of people from the software department several days to competently answer a list of questions from a RFP (Request for Proposal). A sales presentation should be taken as a general indication of the ACD's capabilities. Complex questions should be written down and receive a written response.

Despite these warnings, no one can be more helpful than the sales or marketing representatives. A potential customer has a great deal of visibility within any organization. When a sale is hanging in the balance, a great many people tend to listen. Demand everything and hold out until the final moment--when the lawyer's pen slides across the contract. There is much to be gained and little to be lost by taking a hard line.

CHAPTER SIX

CONTRACTUAL REQUIREMENTS

Most of the contractual decisions will not be left in the hands of the ACD manager. Even a relatively small buyer will or should retain the services of a lawyer. Regardless, it makes sense to be knowledgeable in this area to insure that the communications department is buying all that it wants and needs. When buying any product it is necessary to be thoroughly covered for the potential disasters of business failures and dissolved distributor arrangements.

The written contract actually means little or nothing if it is not thoroughly researched. There is no smaller glory than winning a contract dispute in court while your business is crumbling around a poorly considered piece of equipment. The contract should not take the place of a thorough investigation of the vendor and the vendor's product prior to any purchase agreement. Any contract will have to be tested in the courts if the parties disagree on the fine points. Anything in the contract which is illegal will not be upheld in the courts simply because your signature appears on the bottom line.

There will be different contractual concerns depending on whether the contract covers a cash purchase or a lease. Each contract will have to be modified to account for these differences. In general, if all the information included in the proposal outline is included in the contract, the main points of contention will be covered.

The contract should contain a detailed description of all the purchased features and options. This description should explain, at the functional level, how each feature works and what capabilities the buyer should expect from the ACD. It is a good idea to attach all of the correspondence and material relating to the proposal to the contract. The proposal itself should be attached to the contract as an addendum to insure that any items promised in the proposal response are really available on the equipment contract. Each item should be clearly labeled with the date and title. Any conflict between the various product descriptions should be resolved at the discretion of the buyer.

A section of the contract should be devoted to project management. The basic purpose of this section of the contract is to insure continuity in personnel during the design, installation, and cutover. This section should also specify the development and communication of milestone charts and progress reports during the life of the project.

Site preparation should be defined in the contract in order to clearly delineate what facility improvements should be performed by the customer versus those assigned to the equipment vendor. Many ACD's require special rooms, extra air conditioning and dehumidifying equipment or separate vented rooms for the batteries. All of these items should be specified in detail to avoid confusion or oversights during the project.

The same level of detail specified in the site preparation section should be applied to the installation schedule and description. All of the major activities in the installation process should be listed along with designation of the responsible party. It is important in this section to specify that the vendor supply all the labor and all cables, wire, and hardware involved with the installation of the equipment. The installation cycle is often an area where unscrupulous vendors will attempt to increase the actual price of the switch by charging extra for items that were supposedly included in the "turnkey" bid.

The reliability of the equipment should also be entered as an attachment to the contract. This will clearly document the expected performance standards of the ACD equipment.

The financial portion of the contract should provide a full and detailed accounting of the prices related to these areas:

- Purchase Price
- Shipping Charges
- Insurance
- Delivery Schedules
- Tax Credit Rights
- Property Tax Claims
- Title Assignments

The contract should also include the conditions under which the buyer can withhold payment for noncompliance. Usually the buyer is in a strong position with regard to holding back payments. Few

vendors are willing to take a buyer into court and place their failures on public record.

The financial section should contain a price catalog for all items sold with the ACD. Though it is often difficult to fix the cost of these items, an escalator for inflation may help. For the most part, the technology is changing so fast that the price in ten years will bear little resemblance to the original purchase price and the part itself will probably have been altered significantly.

INSTALLATION AND ACCEPTANCE

The installation description in the contract should include a complete schedule and milestone chart for work to be performed. This description should also include explicit directions about which parties will do each portion of the necessary work. The installation itself should conform to all the applicable FCC regulations and local building codes. The initial site survey performed by the vendor should detail any changes required in the buyer's installation and equipment room to accommodate the ACD. It is sometimes not discovered, until after the ACD is purchased, that the system will overload the air conditioning, for example, and will require major structural modifications that equal the cost of the communications equipment. All of these details should be discussed during the contract negotiations.

The acceptance test must be included in the installation portion of the contract. This section should spell out every step of the acceptance test procedure and specify that the acceptance is to be completed on the installed and working system some period before the actual cutover. The acceptance test section should also state which personnel will be involved in the test sessions. For a large site with a new release of software or a Beta test site, it is essential that a programmer be on site during this phase, or at a minimum, during the final days of acceptance through the first few days of cutover.

The acceptance tests will, at a minimum, include such things as a functional check of all features at each telephone, along with actually placing a call through the switch and answering test calls at each telephone. The acceptance tests should also check all major functional components of the system.

- Power and Grounding Systems
- Network and Signalling
- Peripheral Equipment, CRT's, Printers
- Tone and Digit Switching
- Trunks
- Conference Circuits
- DTMF Senders and Receivers

The vendor's management personnel will not be able to correct any faults which the acceptance test uncovers unless there are competent diagnostic programmers on the site. It is usually not necessary to make the same requirement for hardware personnel, as the installation phase will generally find and correct any hardware problems. If an automated diagnostic routine is to be run as part of the acceptance test, this should also be specified in the contract. Generally each manufacturer will have a diagnostic subsystem which can check all major pieces of equipment, stations, and circuit cards. This diagnostic routine should be run and the results verified by the customer before the equipment is accepted. All software features should be tested under load if possible to insure that there will not be a failure once the call volume reaches production levels.

A complete installation includes the requisite training to operate the system. The contract should detail what types of training are available and any charges for additional training. There is a high turnover rate in the communications field and this additional training is essential for an effective center.

The warranty agreement in the contract should provide a period of free maintenance and correction of any hardware problems for up to one year, with a more limited warranty on the software. The software warranty will vary from vendor to vendor because software is so expensive to fix. Most vendors will not sign up for a one-year software warranty. The service costs should be clearly spelled out, along with the expected delay between a failure report and the arrival of the repair crew. There should be some penalty attached if the service crew fails to respond within the specified time period. Many vendors guarantee two-hour and four-hour oncall maintenance, but there is no penalty provision in the contract if the repairperson decides to have an extra cup of coffee or finish watching a movie before driving to the site.

In addition to the time guarantees, it is essential

to spell out in the contract what training the service personnel will receive and minimum competency standards. There should also be some procedure established for removing the vendor's personnel from a site. There are some site engineers who are just not compatible with certain customers. Removing them can be difficult if there are no established procedures.

A final section of the contract should outline the consequences of the vendor's failure to install the ACD or the buyer's decision to cancel the order prior to installation. This section should also detail the recovery mechanism in case damages are incurred during installation.

SERVICE AGREEMENT

The service agreement should be covered in the proposal and purchase contract. Both the hardware service and software service should receive some mention.

In the case of equipment purchased from a distributor, it is wise to have both the manufacturer and the distributor sign the contract. At a minimum the manufacturer should agree to take over the support service should the distributor fail in this service responsibility or go out of business.

The service agreement should specify who will do the maintenance, how long it will take to get service, and spare parts availability.

Generally the manufacturer should provide a two-hour on-call service for an ACD which performs critical functions. The two-hour on-call agreement will cover minor failures, diagnostic warnings, individual trunk or station failures and items which causes less than 10% of the switch to be non-functional at a given time. Any failures which cause more than a 10% failure or that actually prevent the answering of calls should be covered under an emergency agreement that specifies best efforts to dispatch a technician to the site immediately.

The service agreement should provide for parts, software availability, and service for a five-year period past the purchase date of the equipment. Most telecommunications equipment is justified on a three-year cash flow basis and depreciated over a five-year

period. As long as the manufacturer provides parts and support over a five-year period, any residual value in the switch will already be written off the books in the event that the switch vendor eliminates support for the model installed at a given site.

Nearly every vendor will state that such a provision is not a part of their standard agreements--which is true. The knowledgeable purchaser, however, never signs the standard agreement.

Consider the contract language reproduced below which represents the "standard language" from a major ACD supplier. Try to find at least eight major problems with this contract section and then decide whether you would sign that piece of paper. Keep in mind that nearly every provision that seems objectionable undoubtedly has been changed by at least one determined buyer.

Section 8 Software

"Software, documentation and other information owned by the vendor and its suppliers and provided to customer by the vendor for control of or use with product provided to customer under this agreement or under subsequent orders placed under this agreement shall remain the property of the vendor."

Section 17 Price and Payment -- Purchase

"The product price listed on the Purchase Supplement may vary by not more than plus or minus 5% for unforeseen configuration and or technical changes. Otherwise, the product price listed on the Purchase Supplement is not subject to change unless Customer postpones the installation/delivery date for more than thirty (30) days."

Section 20 Warranty Exclusions

"Except as specifically made herein, the vendor makes no warranties, express or implied, and specifically disclaims any warranty of merchantability for a particular purpose."

Section 21 Exclusive Remedies and Limitations

"Except for delays in installation of thirty (30) days or more, Customer's sole remedies against the vendor for loss or damage caused by any product defect or failure, or arising from the performance or nonperformance of any

work under this Agreement regardless of the form of action, whether in contract, tort including negligence, strict liability or otherwise, shall be (i) Customer's right to receive the repair replacement or refund set forth in Section 19A of this agreement, (ii) Customer's right to terminate as set forth in Section 22C and (iii) the lesser of the amount of actual direct damages which are proven or $ 50,000. If installation is delayed by thirty (30) days or more by causes not attributable to the Customer or <u>force majeure</u> conditions then Customer's sole remedy shall be the right to cancel the order without payment of any cancellation charges."

Section 22 Termination and Cancellation

"Upon termination of this Agreement or any orders hereunder, Customer will make the products provided under all affected orders available for removal, which shall be accomplished in a careful and reasonably expeditious fashion. The products will be returned in the same condition as originally installed, ordinary wear and tear excepted, or Customer will pay for restoration of the products to such condition. Vendor shall be liable to restore the premises to their original condition."

Section 25 Modification to the Agreement

"Any supplement to or modification or waiver of any provision of this Agreement must be in writing and signed by authorized representatives of both parties, except that the vendor may, upon ninety (90) days prior written notice to Customer, modify the terms and conditions of this agreement. Variances from this agreement in any Customer order shall be of no effect."

It should be clear after skimming through these examples that any contractual documents should be thoroughly analyzed and negotiated. The standard contracts supplied by all the vendors are solely for purposes of starting a discussion and most clauses will require some negotiation.

In the event that a switch is purchased from an unknown or small supplier, there should be provisions for turning over maintenance of the switch to a third party in the event the original manufacturer dclares bankruptcy. Many third party maintenance organizations like Western Union, RCA, Sorbus, etc. will provide maintenance services if they are supplied with equipment drawings, electrical schematics, specifications, and spare parts. A contract provision should insure that these items will be turned over to a third party at the appropriate time.

A PABX which stops functioning may not be a critical failure. People will call most establishments back the next day. The office staff can take a breather for the afternoon. If an ACD ceases to function it is a catastrophe. The concentrated revenue-production at the ACD means a great deal of money will be lost for every minute the system is down. For this reason most of the larger, more sophisticated ACD's will provide redundant processors and central control equipment.

The service agreement should state how long an emergency service response will take, the costs of such services, and the location of spare parts and personnel to handle an emergency. Spare parts should be located on or near the customer's premises and should include a spare for nearly every major equipment complement in the ACD. Regional spare depots are not very useful considering the length of time required to arrange delivery to a site.

The ACD should also have remote diagnostic capabilities which allow the vendor to dial up the customer's processors and diagnose equipment problems.

It is prudent for the buyer to understand what types of repairs the site engineer can accomplish and what things will require factory personnel to be sent. Sending a few of the manager's own staff through the vendor's maintenance course is a simple way to acquire this understanding. Often these courses are difficult to schedule and expensive, but they are very worthwhile. At the completion of these courses, which may last three to six weeks, your personnel will gain a general understanding of all of the detailed things that the vendor must perform to keep your switch operational.

It is also critical that one or two people on your staff understand the electrical characteristics of telephone interfaces and circuits in order to point repair personnel in the right direction. The accepted practice in the industry is to assume that the switch is the point of failure first, and after that possibility is eliminated then call the telephone company repair center.

Your staff should be able to operate a telephone installer's handset and some simple test equipment to measure line impairments, voltage levels, current in the local loop, and other basic items. Insuring that your staff possesses this basic level of knowledge will help prevent disagreements between the switch vendor and the transmission company.

SOFTWARE

There should be some provision for the buyer to receive standard product line software enhancements for the cost of a system load or tape build. Vendors constantly enhance the ACD's software through standard and optional catalog items as well as through "internal" fixes that do not appear in the catalog. All of these "internal" fixes should be available to the buyer provided the buyer purchases any additional pieces of hardware necessary to implement the changes (such as additional memory). If the vendor will specify a tradein allowance, this would be useful to include in the financial section. Of course, it is doubtful the negotiators could make an accurate prediction of the system's financial worth at the end of five or eight years.

The primary difficulty in maintaining a digital ACD is the software. This is one area where it is impossible for a person with "general" knowledge to find and fix a problem. Specific information is required (program listings, memory maps, a test bed, software build listings, software library modules) to even find a problem. This is an area best left to the manufacturer and trained service personnel. However, the vendor may go out of business. To be prepared for this possibility, the contract and the service agreements should provide for software documentation and training, at a set fee, should the manufacturer withdraw from the market. This fee will seem exhorbitant in most cases, but the training could allow a group of customers to turn their systems over to another company.

DOCUMENTATION

Along with the description of all features, the vendor should supply a complete set of documentation covering the functional operation of the software and the hardware, the requisite service manuals, a complete set of wiring diagrams, and the parts lists for the diagrams. Companies may find that the equipment must be specified in accordance with the Underwriters Laboratories Code. Electrical workers in many metropolitan areas will not install equipment which is not UL registered.

A lot of equipment is being sold with hopelessly inadequate documentation. This subject should be broached and answered early in the vendor selection process.

The buyer should receive a complete set of manuals that cover the operation of all the OEM equipment used in the ACD and a complete set of vendor manuals detailing the operation and features of the ACD software. All of the commands for the ACD should be clearly stated, along with the error codes and conditions. Each function should have a documented explanation and an operator's manual. The vendor's training department can often supply a book which lists all of the commands and the operating capabilities of the ACD.

The documentation should not be viewed as a limiting factor if you or your staff has the expertise to enhance functions in the system beyond the manufacturers stated capabilities.

One communications manager needed a circuit which would allow the automatic diversion of calls from New York to St. Louis when the New York site was placed in night service. The vendor was contacted and he explained that this facility did not exist. The equipment could not perform such a function without the purchase of a special option. Repeated discussions with the software department, the engineering department, and the marketing department established that this function was not possible without custom software or the purchase of an expensive option with many other unnecessary features. The communications manager continued to insist that it could be done. Finally the vendor suggested that the manager "just hook it up and see what happens." The "special" circuit worked flawlessly.

In another case a customer wanted to install an agent console at roughly twice the manufacturer's recommended distance from the central switch. The engineering department insisted that the specification could not be exceeded, but the installation group laid the wiring and had no trouble with the remote console.

If any particular specification does not match the operating requirements of an ACD application, it is always worth while to ask again and finally to experiment. The specifications are generally designed with an engineering margin to insure adequate service under adverse conditions. If conditions are not severe, the specifications can sometimes be exceeded.

The manager who needs a special piece of equipment should not hesitate to consult with the engineering department, outside consultants, or other equipment

manufacturers to discover solutions. The vendor should always be notified in these cases, and the contract should be carefully reviewed to insure that no warranties are violated. Often a simple solution may be found in plug-compatible equipment outside the ACD vendor's store.

The telephone companies are particularly creative in this regard with their own purchased equipment. Of course, their extensive engineering staffs have greater resources with which to recover from the experiment, but this is an area which deserves some thought. Many ACD sites have installed automatic answering devices, peripheral equipment, slave printers, slave video monitoring equipment, etc., which have appreciably enhanced the worth of their ACD.

CHAPTER SEVEN

CUSTOM SOFTWARE

Only one warning need be stated, and restated, about custom software. Don't plan it, don't buy it, don't install it. Programming is a marvelous discipline. With a few simple changes, a word here or there, a number or two altered, your ACD can be doing something none other in the world can--and that you'll continue to pay for during the life of the switch.

One ACD management staff installed a custom dialing plan which would allow agents anywhere in the network to dial other departments by a recognizable acronym code. If someone wanted to call the training department in Los Angeles they would key in "TRLA." It was an ingenious system, but every time a department moved it required the creation of new tables to coordinate the actual phone number with the abbreviation. About $ 100,000 was spent every year getting the manufacturer to build new tables.

Custom software is also difficult to maintain. Each vendor has a library of generic software programs and a library of the programs which are running at each customer's site. These libraries contain the customer configuration and any vagaries in the standard and optional features at that site. Writing a software program is much like flying from Atlanta to Salt Lake City. There may be any number of ways to get there, but only one optimal route. Because of the variety of ways that a program can be written, not everyone can read the programs that someone else has produced. Since programming for a real-time machine like an ACD is complex, there is always the chance that some arbitrary combination of events will crash the entire operation.

One computer system was put on the market some years ago which would cease operating at a specific time on a specific date because of a glitch in the way the operating clock was interpreted by the software. If this had not been caught by a mistake (someone accidentally set the clock ahead by three months), every computer of that type would have dropped dead simultaneously.

If there is a piece of custom software in your ACD,

there will be extra time and expense required for its repair. The problems of your unique system just will not be understood as well as that of standard product line software. If there is a special feature which seems essential to the effective operation of the ACD, then every effort should be made to convince the manufacturer that your request become standard product line software.

Every vendor has facilities and procedures for upgrading the generic software in the ACD at regular intervals. Any custom feature or special item can become a part of that generic enhancement if there appears to be sufficient interest and a reasonable profit margin. In some cases it may be best to purchase the ACD and then lobby among the vendor's other customers for the software enhancement. Often just holding out on the sale will be sufficient incentive to coax a new "product line" item from the vendor. The major advantage of obtaining a product line software enhancement is that the development cost might be shared among several buyers and, more importantly, that feature will continue to be enhanced and supported along with the other product line items in the next software release. Custom sites often fall behind and either lose their feature with the next release, or find themselves unable to install the new software.

Either way, custom software is rarely worth the price unless it is clearly cost-justified and the communications department is fully willing to carry the additional costs throughout the life cycle of the equipment.

There is one important exception to the caveat about custom software. There are some very significant changes that should become available to the telecommunications community in the near future which will provide some of the sophisticated technological facilities common in the data processing industry.

None of the telecommunications equipment on the market is user programmable, with the exception of some routing tables or phone feature tables. The next generation of telecommunications equipment will provide an applications programming area in the switching equipment that will actually allow users to custom engineer the switching functions. The initial seeds of this development are already evident in the customer formatted report packages pioneered by AT&T and developed further by Rockwell International, as well as other manufacturers

These user application areas will allow the development of programs that actually control the switching function. Some obvious applications would include things like telemarketing programs which routed calls to specific agents based on the telephone number dialed by the caller. Computer interfaces could be established that would generate custom agent displays based on the type of call being handled. Automatic reports and sophisticated interfaces to the intelligent networks that AT&T is introducing through Enhanced 800 Service and the Integrated Services Digital Network will be possible with this enhancement.

Once capabilities of this sort are available, telecommunications departments will require programmers just as the data processing departments currently do. The benefits to creative users who aggressively develop applications that meet their communication needs could be enormous. The inevitable integration of host functions and PABX functions in the automated office will require that the telecommunications equipment of the future be able to accomodate rapid changes in software functions and switching capabilities. These user programmable switches will provide the communications department with another resource to insure cost-effective, sophisticated services to the company.

CHAPTER EIGHT

SELF-MAINTENANCE

Armed with a complete kit of spare parts, an on-site engineer with minicomputer background and vendor training, and a regular shipment of the vendor's internal and OEM documents, a large ACD user can maintain the equipment at less cost and with better service than the vendor can supply.

The only thing that cannot be handled is the software. There is virtually no way that a part-time software maintenance staff can understand, diagnose, and repair software problems. This is a job for people who work with the software every day and have at their disposal a complete development system and an ACD test bed.

Do-it-yourself maintenance on the hardware may be a good buy. The maintenance contracts on a large ACD can easily run from $1500 to $3000 per month. For this price an extremely competent engineer can be hired to take over the maintenance function for the ACD and other data processing equipment. Generally at least two people should be hired for a self-maintenance program to insure coverage during vacations, illnesses, and turnover. A person with a two-year degree in electronic technology or electronic equipment repair is usually qualified enough to successfully attend the vendor's maintenance schools.

If the ACD manager starts a self-maintenance program, and there are many who are doing it quite successfully, there should be an agreement with the vendor to provide updated engineering notices on a regular basis, along with additional training courses when a major change occurs. The same spare parts which are available to the other users should be provided to the self-maintenance customer and at the same prices. The manager should not try to cut costs on the spare parts inventory. The initial purchase of the spare parts can amount to sixty percent of the total ACD purchase price, but each spare is critical and a complete inventory should be maintained.

Once in the self-maintenance program, most users

discover what the vendors have known all along. Less than 10% of the maintenance involves technically complicated and sophisticated analyses of elusive problems. Most of the maintenance effort is expended putting new cords on phones, moving phones to the other side of an office, and replacing bulbs or lamps in the display consoles.

Since the agent consoles receive the most use, a great majority of the time is spent with these instruments replacing key caps and fixing frayed cords.

There are occasions where very complicated repairs will arise and at those times it is often helpful to hire the vendor as a consultant to identify the problem--which is often much easier to fix than it is to find.

CHAPTER NINE

INSTALLATION

The installation phase begins with the site survey shortly after the contract is signed. The site survey will determine the facility requirements for the ACD equipment room and any additional work which needs to be completed on the power supplies and air conditioning. The site survey also provides the final list of materials for the ACD center and the preliminary wiring diagrams for the system center. In the case of the smaller ACD's this survey may not be necessary. Some of the ACD's at the very small line sizes can be wheeled into an office area, take up about the same space as a few filing cabinets, and only require interconnection with the distribution frame to begin operation.

The installation procedure should be laid out in a complete project plan. During the period of time between the order and the installation, all of the system designs and the line interface requirements should be reviewed. This is a good point at which to meet with the telephone representatives, explain that your company is buying equipment, and ask for advice on any additional circuits or equipment the telephone company, as the interexchange carrier, will have to provide.

The telephone company should be totally aware of any additional load which the ACD installation may put on the serving central office. The installation of several large ACD's in Los Angeles over the past two years nearly brought the central offices to a standstill. With adequate warning the telephone company can provide the facilities required to handle the additional traffic that an ACD can draw.

There are considerable lead times on new circuits so it is best to plan as far in advance as possible to order these circuits. Some of the telephone operating companies are experiencing a critical shortage of termination cards and other equipment needed to implement new facilities. Large orders will require significant advance planning. In the Post-Divestiture environment orders are inevitably delayed if they require the services of an interexchange carrier. A bundle of FX orders placed with AT&T that contains more than eight circuits will be placed on a special

project status, which does not imply expedited service.

The vendor should provide a complete timetable for each of the installation steps. With this schedule the training and staffing programs can be coordinated.

A typical milestone schedule, as opposed to the detailed project plan, will include the following major events:

Event	Elapsed Days
Execution of Agreement	1
Finished Equipment Room	30
Electrical & Environmental	45
Cable 75% Complete	55
Delivery of Hardware	75
Cutover of System	90
Acceptance Test	120

The vendor will request a letter of agency from the customer which will allow the vendor to coordinate the placement of orders with the local companies and exchange carriers.

Once the installation cycle is complete, the equipment still needs to be tested by the customer to insure that all functions are operating as advertised. This step is known as the acceptance test.

The acceptance procedure is one step that requires complete concentration and maniacal attention to detail. Unfortunately, the acceptance procedure takes place at a time when no one is emotionally prepared to provide the energy it demands. The acceptance test occurs in the last one or two weeks of the entire selection, purchase, negotiation, installation, and training process. The acceptance test will run right up to the time of cutover, and at this point everyone wants to turn the system on and try out the new toy. The salesman may plan a party which everyone is eager to join. In addition, there will be pressure from upper management to accept the ACD, as well as the arrangements with the telephone company for swinging the new trunks into place.

The only sensible approach in all this is to allow sufficient time for the complete acceptance test. In a large ACD with a complete acceptance test procedure, it may take up to three weeks to push all the buttons and check all the reports. This may be three weeks of fourteen-hour days. Not one detail should be overlooked. Every item should be checked while the system is operational but not under full load. At this time it is easy to identify problems, and more importantly, the vendor has money hanging in the balance.

The manager should have examined the acceptance test prior to signing the contract and agreed with the level of detail in the test. In most cases the test will turn up items that are incorrect. If an option will not work or a termination is incorrectly identified, the acceptance test should find and correct all of these problems.

One part of the acceptance test procedure which most managers fail to consider is a check of the software listing for their site. Each vendor will have a set of forms which the vendor and the customer fill out together detailing the configuration and interfaces within the site. This form is then keypunched and used to produce the actual software delivered to the customer. Errors can occur in this process. The manager can save a great deal of trouble during the acceptance test by reconsidering the configuration input after the software listings have been generated. Any discrepancies between the options list and termination tables can be straightened out by the vendor before the software is installed at the site.

The acceptance test should check the following:

1. all call-handling capabilities and features at each agent set and on each trunk;

2. all reporting capabilities with timed correlations between staged calls and the accumulated report fields; and

3. all diagnostic functions. This procedure will involve placing a call on every trunk in the system and at every agent set in the system.

For a large ACD with tandem and PABX capabilities built in and several hundred different operational capabilities, this is going to take considerable time

and effort--time and effort well spent. It may take months to find the problem once the system is under a full workload.

The manager should also be aware, and should not be surprised, that there will be problems. A conditional acceptance is possible, with exceptions noted for small items, in order to complete the cutover on schedule. This should not be allowed where there are major problems, but the minor things can be cleared up without too much trouble by the programmers on site during the cutover.

The primary consideration for a successful cutover is a good working relationship with the local telephone operating company. The cutover requires considerable coordination between the vendor and the telephone company. During this process the trunks from the old equipment are disconnected and reconnected to the newly installed ACD. The trunks are moved one at a time in order to progressively increase the load on the system and to individually test the performance of the circuits.

During the cutover period, the vendor should have both hardware and software personnel on site. There will always be a few bugs in the system that can be discovered only if the system is under a live traffic load. Some cases will not require any hardware personnel, but a few programmers should always be available.

It is also sensible to provide some additional direct telephone lines to the facility in case the new communications equipment fails. A successful cutover requires a considerable amount of pre-planning. The cut should always be scheduled for a low-traffic period, on a weekend or at night.

PART III

DEFINING THE ACD ENVIRONMENT

CHAPTER TEN

SYSTEM GOALS AND SPECIFICATIONS

There are several external and internal factors of which the ACD manager should be aware to effectively run an existing communications center or to install a new center.

The external factors can be divided into two related spheres of influence: the corporation and the outside world. The outside world is the set of all influences which affect, but are not directly a part of, the corporation. This refers to the competitive and regulatory arena within which the corporation must work. The ACD manager will have little influence over external problems, but it is critical to understand the regulatory nature of the ACD's outside environment. In this era of increasing competition each manager is well-advised to study the FCC regulations governing telecommunications.

Many ACD's, especially those within the utility companies or regulated monopolies, are governed by a public utilities commission or outside governing body responsible to the state legislature. Because these regulatory bodies may be empowered to enforce various levels of service and the type of reporting that is necessary, their requirements should be studied in detail. Governing commissions which enforce a particular service level often have different requirements for determining the reported level. A commission which demands that ninety percent of all calls be answered in less than ten seconds may seem rather strict--until it is discovered that this average speed of answer can be figured over all the hours of ACD operation and that the commission assumes "all calls" to be those handled, rather than those offered, at the ACD.

Understanding the regulatory environment should also extend to the legal technicalities of managing the agent staff. An ACD is prone to several types of staff problems. There may be union labor or non-union labor available, depending on the application. In some cases it may be worthwhile to investigate moving the ACD to another location or building a center in another town to take advantage of fewer labor problems, lower cost

labor, non-union labor, or higher quality labor. In an ACD application with highly technical or intricate answering responsibilities, it may be necessary to locate the switch in a university town with a large population of educated workers. For a union shop it may be necessary to consider what types of reports can be gathered without violating the labor contract. In some cases union regulations will prevent the gathering of individual performance statistics on the agents. Special monitoring and recording of conversations are not allowed under the laws of some states or the regulations of various unions.

The principal internal demands are the stated service levels and the operating budget for the center. The operating budget will usually reflect whether the ACD is a revenue-producing operation or an expenditure center. An expenditure center is one which provides a service to the outside world as an adjunct to some other revenue-producing activity without directly charging for, or realizing, a profit from the transaction.

For the airlines this would include all of the calls from eager groundlings checking and re-checking the anticipated arrival time of delayed flights. In the telephone industry the Directory Assistance function is an expenditure type of ACD operation. The telephone company has to provide assistance in order to run their business, but they would rather not since local assistance calls generate little revenue. The airlines would rather not have people calling in for flight times, but this is a necessary cost of business.

A revenue-producing center handles those calls which generate some type of sale--whether that be record albums or catalog sales. Typically, any ACD will have a mix of revenue and expenditure functions. One gate will be set aside to handle revenue functions like selling tickets, and another gate will provide information on flight arrivals or some other service.

The corporation will usually set different service level requirements for each type of gate. The manager should be aware of the service levels expected by the corporation, the terms they are expressed in, and the resources that are made available to meet those service levels. The service level will usually be expressed as a function of the percent of calls answered in so many seconds, i.e., 90 % of all calls in ten seconds or less. If different service levels are set for various gates, the manager should be aware of this, understand how the

level was determined, and the justification for its establishment. There will also be, in all likelihood, a specification as to the number of calls which can be blocked or abandoned per gate and some figures on the blockage factors for incoming trunks.

The manager should also identify the types of reporting that are required by upper management and analyze in detail the formulation of these reports. Often the ACD manager will be working with a set of required management reports that do not match the reports that are produced and printed by the administrative data system integral to the ACD's software system. An understanding of where these two reporting requirements differ and where they intersect is critical to effectively representing the operation of the switch to management.

If the reports produced by the ACD and those needed by management are dissimilar, a great deal of hand labor will be required to translate the machine reports into the accepted form. In this case every effort should be made to educate management as to the types of reports that are readily available. There is often no compelling reason why upper management has chosen the reporting structure to which the ACD manager must conform. The reporting structure will often be the last vestige of an outdated ACD which provided the information in a certain format that was eventually incorporated into the required periodic reports. Most of the call-volume reporting that is passed along should be photocopied from the printed records just as they are, summarized on the ACD reporting system. There would have to be a very strong rationale to justify the enormous money some companies spend to have two or three analysts translate and transcribe numbers from one report onto another for two or three days out of each week.

After considering the constraints and requirements of the world beyond the corporation, and the corporation itself, there remains the task of identifying the configuration and goals of the ACD system.

NETWORK MAP

When defining the operating environment of the ACD center, a network map is needed to understand the overall operation of the switch and the potential for replacements within the trunking matrix. The map is an

TRUNK MAP

800-351-0256 FBD Band 5
800-351-0257 FBD Band
800-351-0258 MT Band 5
800-351-0259 MT Band 5

GATE ONE

Cost - 28¢ per call
Revenue - $90 per call
Calls handled - 6000/month
Avge call handled - 220 secs
Avge speed of answer - 5 secs

GENERAL SALES

743-8190 Tie-line
743-8191 Tie-line

GATE TWO

Cost - $600 /month
Revenue - $85 per call
Calls handled - 800/circuit
Avge call handled - 120 secs
Avge speed of answer - 10 secs

RESERVATION

389-5143 Local
389-5144 Local
389-5145 Local

GATE THREE

Cost - $35 /month
Revenue - $0
Calls handled - 400/circuit
Avge call handled - 290 secs
Avge speed of answer - 20 secs

EXECUTIVE

421-8456 FX Kansas City
465-8756 FX Chicago
576-9586 FX St Louis
567-8896 FX Colombia
497-9263 FX Canton

GATE FOUR

Costs - 14¢ per call
Revenue - $25 per call
Handled calls - 5000
Avge call handled - 145 secs
Avge speed of answer - 20 secs

TOURS

invaluable tool for maintenance and equipment ordering.

The "map" should be somewhat along the lines of the chart in the Figure III-1. This type of organization, altered to fit the requirements of the individual ACD, should list all of the incoming and outgoing trunks which terminate at the ACD. This will include the WATS lines from the central office, the tie lines and intermachine trunks, the FX circuits, any transfer trunks between the ACD and foreign switches, the long distance circuits, and any specialized common carrier circuits. Each one of these circuits should be grouped in the diagram to show the gate or facility within the ACD it services and the functional identity of the types of traffic which each line, or trunk bundle, carries.

Along with this thorough accounting of the lines terminated at the ACD, there should be information filled in beside each trunk for the costs of the circuits and the revenue carried by each circuit. The cost/revenue figures are necessarily dependent on the traffic load for each circuit and this information, broken down by individual circuits and by trunk bundles within a rotary, should be entered on the chart. This will provide some clues as to the cost/benefit ratio in terms of traffic and revenue that any given circuit is providing. The cost figures for the trunks should include the mileage charges on each type of circuit and a quick look at alternative costs for other types of service. A few rules should guide the manager as the trunk analysis is done in order to more closely examine those circuits which seem uneconomical. These rules can be generated by the procedures listed throughout Part IV on the establishment of system parameters.

Tables describing the class of service on each trunk and the routing structure for outgoing ACD, PABX, or tandem calls should also be included in the analysis of the functional identity of the trunks within the ACD.

The entire subject of routing structures is heatedly debated in the communications industry. The manager should be aware of the literature about different types of queuing in the ACD and the different mechanisms available within the ACD for least-cost-routing. The class of service marks in an ACD allow the manager to restrict access to various trunk groups by different staff members within the ACD. Typically, agents are given the lowest class mark (or priority) and are only allowed to dial within the local numbering plan. Administrators may be given a class of service

high enough to allow direct dialed international calls. Whatever scheme is used, the class of service designation helps control the cost of outgoing traffic.

If the ACD is being used as a node in a multi-ACD load-balancing or tandem switching scheme, the load-balancing parameters and the amount of traffic experienced under normal and overload conditions should be examined.

In the case of a tandem network (not related to Tandem Computers) using ACD's as the switching centers, it is also useful--providing the expertise is available--to complete a study of the network loss plan. Many companies are still uncertain in this area and do not fully understand the circuit levels which are provided in a given situation. The ACD manager would do well to study this topic in the AT&T technical reference "Notes on the Network." An ACD operation may require precision-balancing over and above what might be expected from a cursory examination of AT&T's VNL plan.

The traffic and revenue figures should be supplemented by graphs of the service levels that each group of trunks connected to any particular gate is expected to meet. The service level on the trunks, in a multi-gate configuration, will probably be different for different bundles. A gate which generates a great deal of revenue per call should have a more competitive service level than a gate which primarily makes outgoing calls, or which handles general information requests that do not generate any revenue.

Service levels should be charted in terms of the percentage of time that all trunks within a group are busy and the percentage of time that the trunks within any group are carrying traffic. It is essential in an ACD operation to look at the percentages of all trunks busy in conjunction with the manning levels at the gate. The number of people who are active in the gate can have a great impact on the blockage level in the trunk reports. If a gate is understaffed, it is useless to increase the number of trunks to lower the blocking probabilities. More people will be delayed at the gate and wait longer in the queue. People will wait a very long period of time, get no answer from the understaffed gate, abandon the call, and be replaced by someone else who waits a long period of time and then abandons the call. The gate must be staffed at the proper theoretical and practical level in order for the blocking probability formulas to have any validity on the trunk groups.

The average handling time at the gate, as measured for the agents, is not a reliable number to use in trunking determinations. The average handling time does not include the holding time on the trunk generated by the interval in the delay queue. The agents may be answering a load of ten erlangs while the serving trunks are offering a load of fifteen erlangs. The five erlangs of lost traffic are held in delay queues for some period before hanging up. This traffic increases the load on the trunks, but contributes very little to the efficiency of the agents. The trunk holding times will be quite high, while the average handling time for the agents will remain constant.

In addition to these considerations, the manager must examine the reporting structure which is generating the trunk figures. ACD's are so easily reconfigured that trunks can be moved from gate to gate until they end up wildly out of sync with the proper reporting groups. There may be trunks in any particular group which are taking calls from several different rotaries and from several different gates. A general effort to correlate the trunk, agent, and gate assignments with the reporting structure should be undertaken.

At the other end of the line, the ACD manager should look at the termination of the circuit in distant locations. An examination of the central offices and their positions within the numbering plan may demonstrate that it would be more economical to terminate an FX circuit in a different portion of a large metropolitan area.

A thorough accounting should be made of all the equipment on site and the current charges for that equipment. The telephone company's itemized bill and any vendor's list of materials should be compared with what is on site and any discrepancies in billing should be rectified.

Many times the manager will discover that the night shift is using a completely different set of agent consoles than the day shift. In other cases there will be circuits which were ordered and paid for but not installed. The extensive reporting capabilities of the electronic ACD's allow for a relatively painless tracking effort on all of this errant equipment.

CHAPTER ELEVEN

TRAFFIC ANALYSIS

When using a PABX it is usually sufficient to line for a low blocking probability in the busy hour of the busy day for the year. Many PABX managers assume that the busy hour will contain 14 to 17 percent of the total day's traffic and develop the theoretical traffic patterns and trunking requirements based on that assumption.

In the ACD environment the daily and even the hourly traffic fluctuations should be known and the system adjusted accordingly for maximum efficiency in the face of any load. Many airlines with non-union personnel change their staffing levels hourly. General Telephone examined the agent occupancy every fifteen minutes to account for shifts in the predicted traffic pattern. Other ACD users run split shifts, variable period shifts, and use a part-time staff to match the staffing levels to the incoming traffic.

Nearly every ACD takes advantage of the seasonal and monthly traffic variations to install or remove incoming WATS circuits. With careful planning the manager can save considerable expenses by fine-tuning the ACD in accordance with traffic fluctuations. One communications manager has so effectively refined this procedure that the center obtained a per-minute charge on the WATS lines which is below the figure AT&T representatives said should be possible. The electronic ACD's allow completely painless changes in the number of agents assigned and the number of trunks or supervisors at each gate.

In order to perform this type of configuration management, it is necessary to thoroughly understand the ACD's traffic load, both incoming and outgoing. The traffic measurements described in Part IV should be applied to gain a thorough knowledge of the traffic flows and their distribution among the various gates. If the ACD is also being used in a multi-node load-balancing or tandem arrangement, the task becomes more difficult but still manageable.

If a new ACD is being installed, the traffic analysis is more difficult. Some information can be gained by looking at other sites of similar function and size. Additional insight can come from the telephone company records for equipment that was previously in place. The ideal situation is to work with an installed electronic ACD which has already generated reports over the period of the study. Failing this, more cumbersome methods will have to be used.

The traffic analysis should be as detailed as possible and include a set of graphs, like those in Figures III-4 through III-7, for the yearly, monthly, weekly, and daily traffic flow. These graphs should be constructed and studied until the ACD manager is confident the pattern has been found. This type of analysis over a long interval should indicate whether traffic offered to the ACD is increasing or decreasing. These long-term trends should be determined and predictions made for the eventual upgrading or downsizing of the ACD. The manager should pay particular attention to discerning which holidays and seasonal events affect the traffic load enough to justify additional staffing.

The traffic analysis will be quite similar to the work done for the network trunking map, and some of the same information can be used in both studies. Traffic analysis is discussed in more detail in a later section.

The traffic itself should also be identified by the gates to which it is directed and the functional identity of the call types within each traffic stream. The various gates will all experience traffic of a different sort. The traffic should be broken down in this manner to determine the call-handling parameters within each gate.

The functional identity of the calling traffic will show whether there are mixed functions within any one gate. For instance, a credit card authorization center may be handling complaint calls within the same gate that is answering authorization requests. This would lead to an imbalance in the call-handling times on the authorization calls as they would be averaged against the much longer time spent on complaint or security calls. This is a rather obvious example. The mixing of call identities can occur in a number of more subtle forms. In one case, a bank service center was handling seventy-five different types of calls within a single gate. For a variety of reasons it was impossible to

YEARLY TRAFFIC ANALYSIS

Center Open 7 Days Per Week 24 Hours Per Day

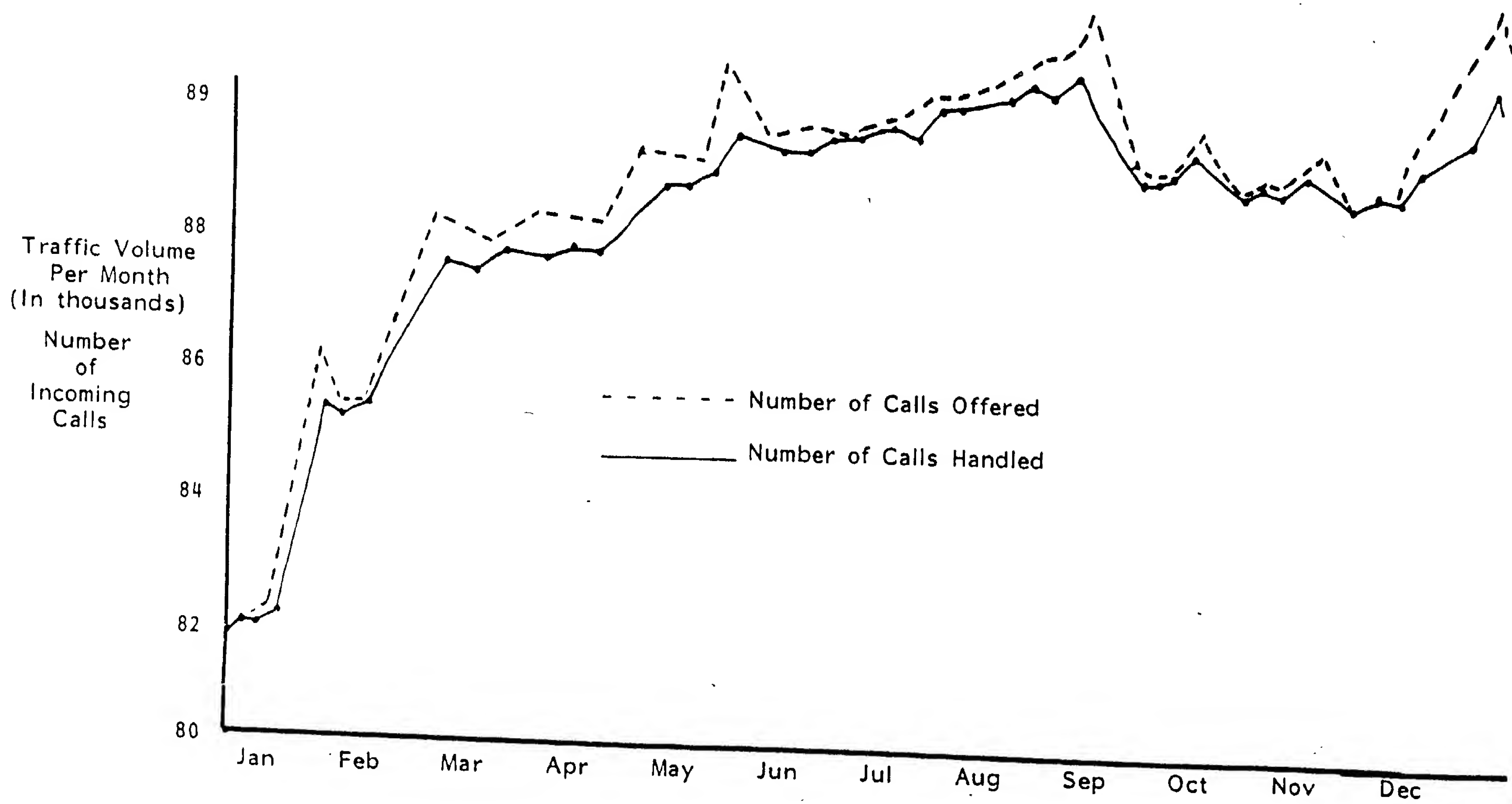

Figure III-4

YEARLY TRAFFIC ANALYSIS

Center Open 7 Days Per Week 24 Hours Per Day

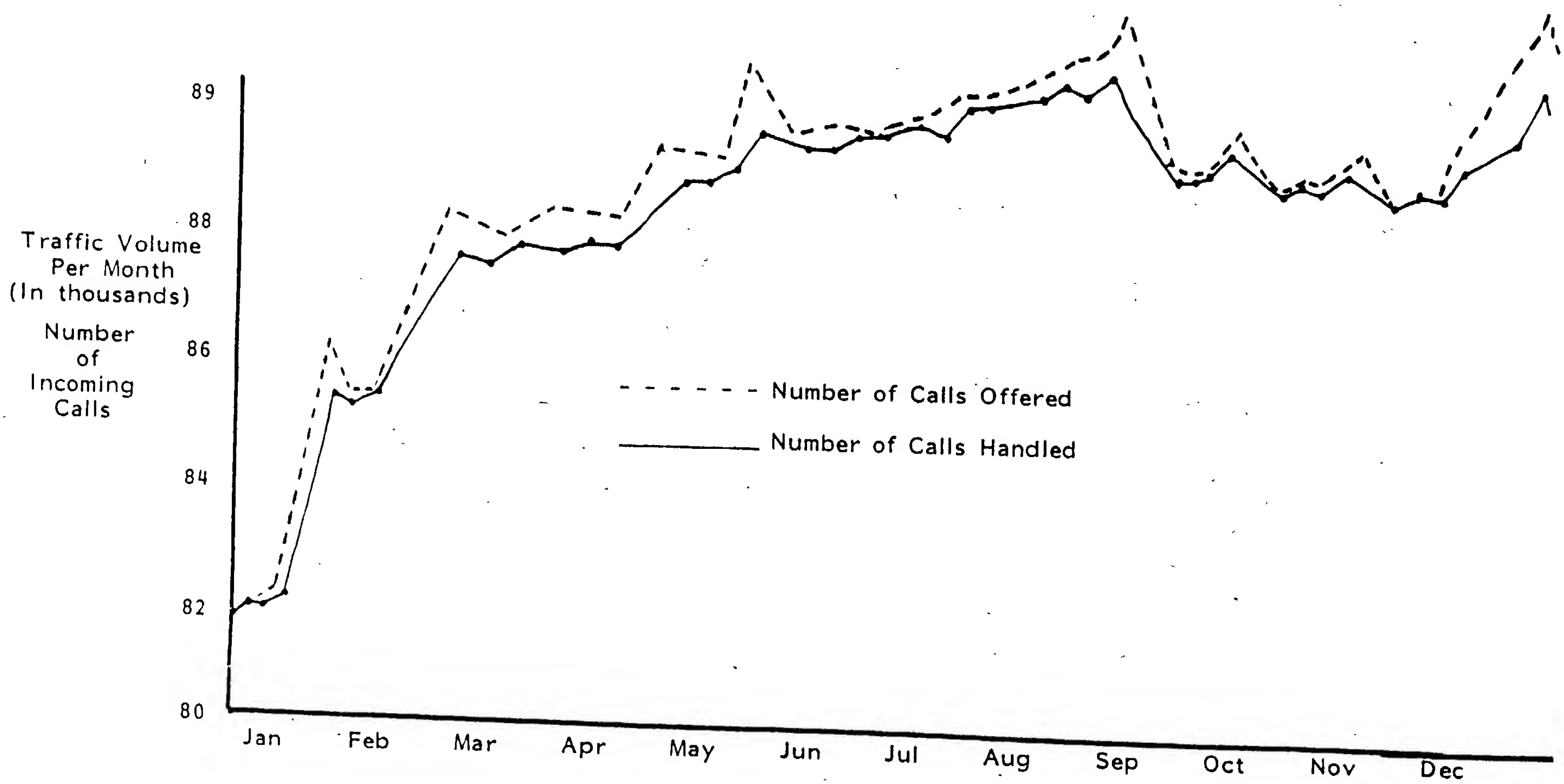

Figure III-4

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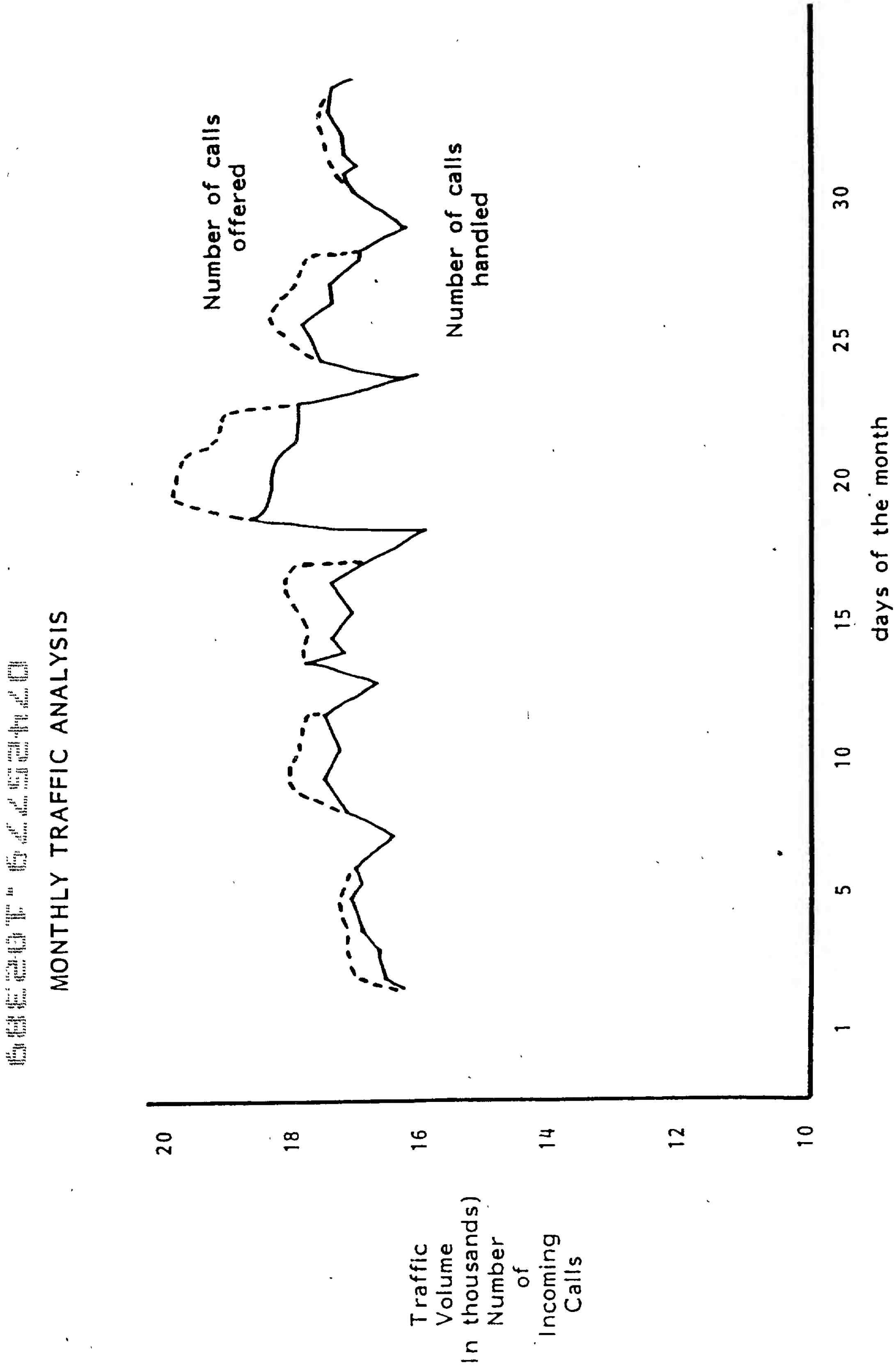
MONTHLY TRAFFIC ANALYSIS
Number of calls offered
Number of calls handled
Traffic Volume (In thousands) Number of Incoming Calls
20
18
16
14
12
10
1
5
10
15
20
25
30
days of the month

Figure III-5

WEEKLY TRAFFIC ANALYSIS

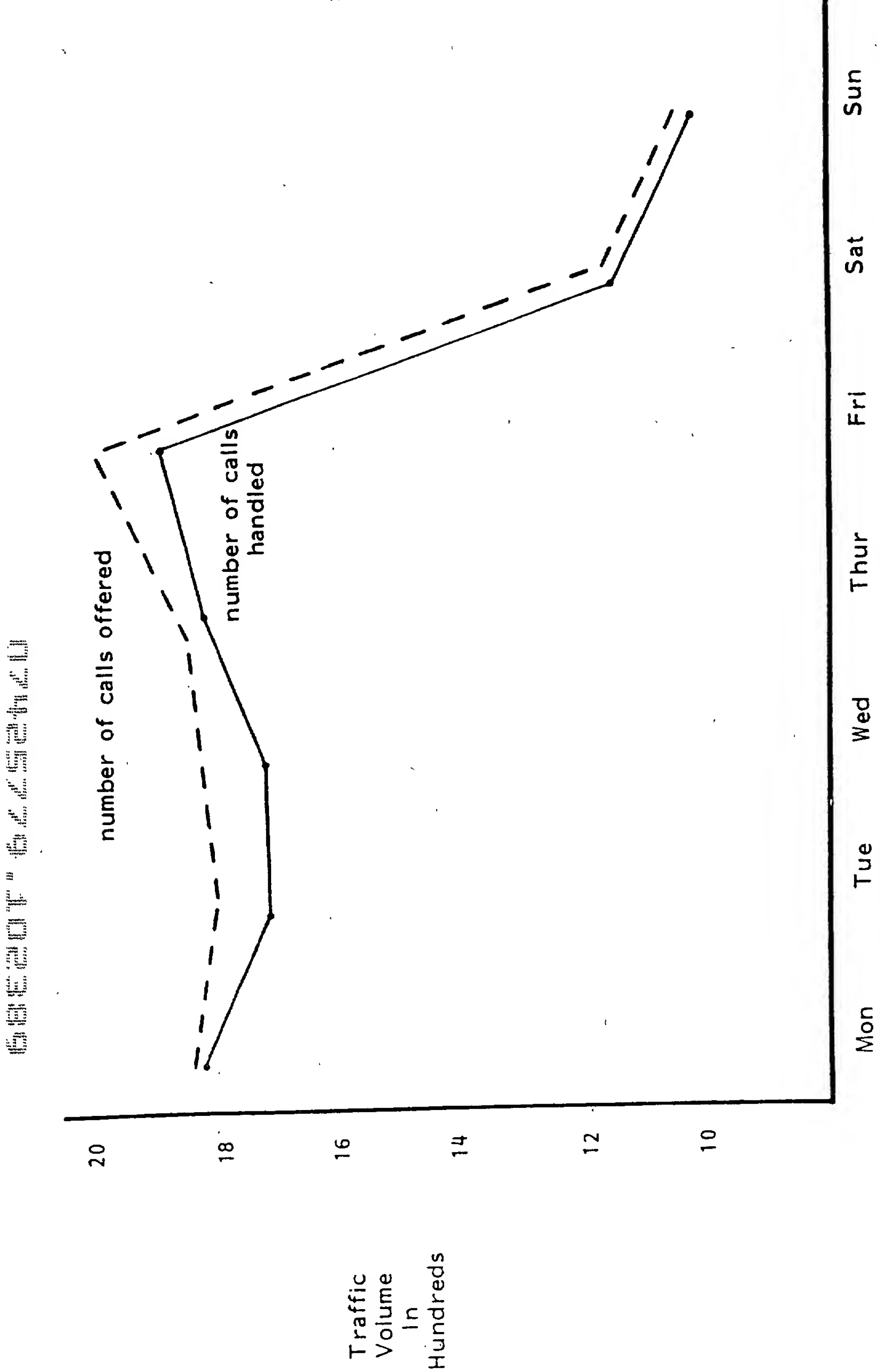

Figure III-6

DAILY TRAFFIC ANALYSIS

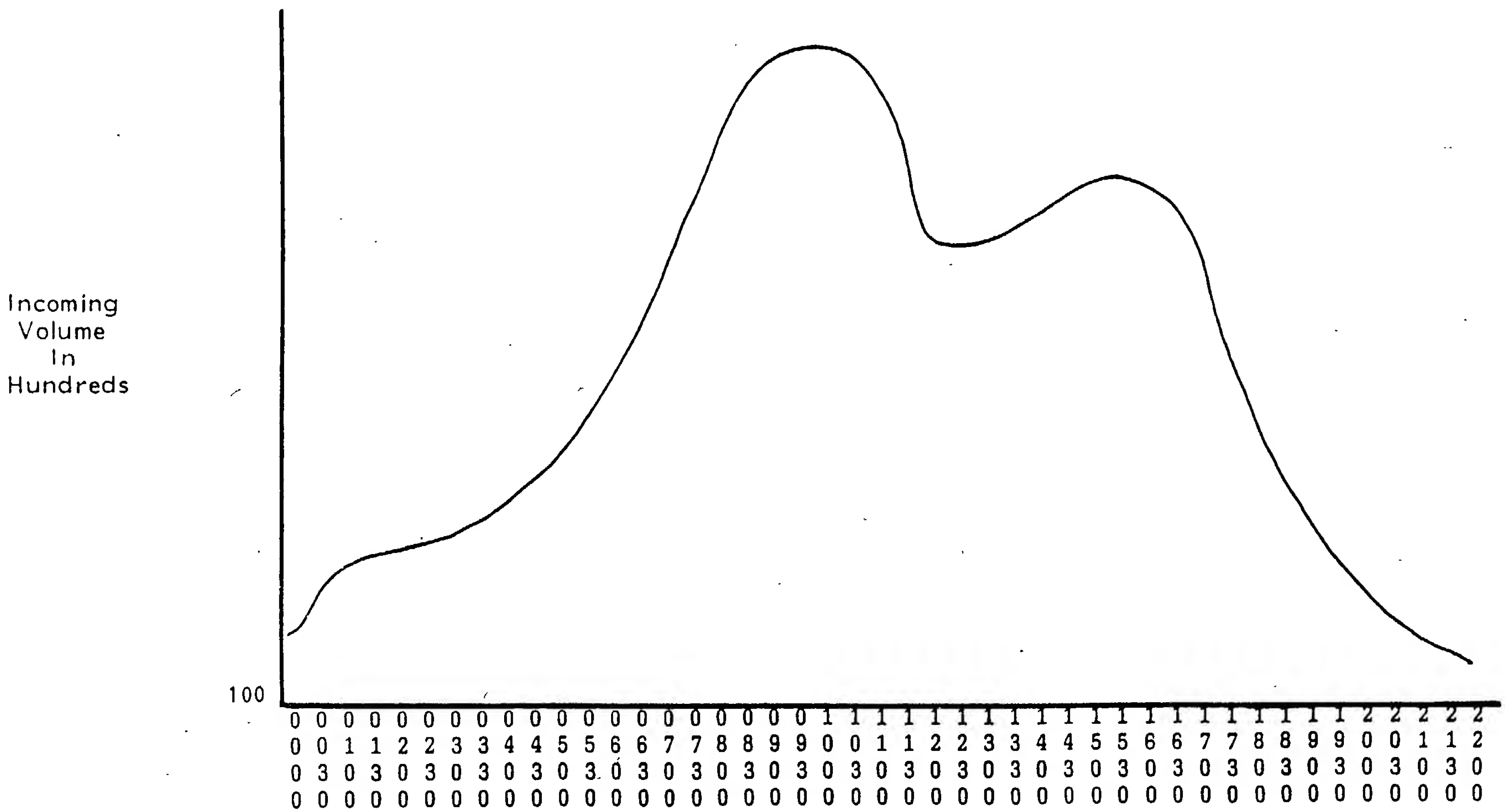

Figure III-7

separate these calling types into different gates. In other centers it may make more sense to break down this activity and specialize the agent's job responsibilities.

In addition to a study of the incoming call pattern, it is also useful to examine the internal calling pattern. If there is a great deal of transfer activity between gates or a lot of outgoing calls from one gate, it may be possible to reconfigure the trunking to make more efficient use of an agent's time.

The actual cost of each calling type, for each traffic stream at different calling volumes, should be used to summarize the results of the study. By combining this information with the service levels established for the different gates, it may be possible to make recommendations on more efficient calling patterns.

It is also essential to chart the call-handling statistics within each gate. The principal figures to examine are the volume of offered traffic, the volume of handled traffic, the abandoned traffic, the average speed of answer, the average delay in queue, and the average positions required to handle a given traffic volume. These figures can be used as a preliminary data base for setting the system parameters and redefining the service levels for each gate.

The long-range traffic analysis will contain the same type of information found in the traffic analysis, naturally enough, but will be mixed with the business projections for the company as a whole to establish the five- and ten-year operating plans for the center.

When performing this analysis, the ACD manager will need the assistance of the finance and marketing departments to acquire an accurate picture of the expected business growth over this period. The volume of traffic that can be expected given any particular change in the corporation's income should be charted, with minimum and maximum trunking and staffing figures appended. This type of chart will allow for an orderly expansion plan and assist in the construction of new facilities. The manager should be aware of the lead times for equipment delivery, allowing plenty of room for error when ordering equipment.

This long-range view of the traffic should also examine the alternatives to the present trunking mix

given the projected traffic volumes over the ten-year period. A private microwave system or company-owned and installed telephone circuits may be economical at some point. The staffing levels required should be passed along to the other departments to assure adequate new personnel and training facilities. The addition of equipment to the ACD can often be coordinated with additional PABX or tandem facilities to improve the overall economy and operation of the communications center.

With advances in the available technology, there are now several alteratives to handling transactions strictly by staffing an agent at an ACD position. Whenever an ACD expansion is contemplated, the center manager should consider the application of audio response equipment, voice recognition equipment, or specialized transaction data terminals as alternatives to adding ACD agent positions.

All of these alternatives are less expensive than the ACD because of the elimination of the human operator. In one very successful example of such an effort a major transaction processing service bureau migrated 40% of their volume from voice operators onto electronic alternatives over a two-year period. In this example over one-million calls a month were shifted at a considerable savings to the company.

CHAPTER TWELVE

ACD ENVIRONMENT ANALYSIS PLAN

The ACD Environment Analysis Plan serves as the guide for any ensuing work with the ACD. It is the basis for any procurement effort and the operating schematic for budgeting and staffing throughout long-range planning.

This plan should be an intensive effort with dedicated personnel--much like the so-called "Green Room" projects that some corporations use to organize major development expenditures. In fact, this effort could be approached much like the Strategic Business Plan undertaken by the Marketing and Finance departments of many major corporations. The size of the communications department, its budget, and the visibility of this department to upper management will determine the grand or impecunious scale of this effort. In many small departments this plan will actually be an internal effort by one or two people.

The approach presented here is very formal, but the same ideas will work on a smaller scale. In many small departments this plan will actually be an internal effort by one or two people. Similar information should be gathered, although the formal presentations will be eliminated. This study, however undertaken, should result in a comprehensive plan for the communications department that will become part of the capital budget and justify whatever expansion is deemed necessary for the current facilities.

For those companies with a multi-part communications department, including data and voice (with PABX, tandem and ACD functions all within the voice area), the plan outlined here for the ACD will be simply one part of the entire department's planning. Completing this plan may take only a week for a small department with a single ACD--or require a month of intermittent activity for an integrated voice and data system in a multi-node configuration. It is essential to limit the time available or untold thousands will be spent plastering pinholes and gilding edges.

This planning effort should involve the communications management personnel, the managers and

supervisors from the users group, and the necessary analysts from the finance department and the communications shop. Some caution should be exercised in such a venture. Business planning can become a morass of wasted money and paper, serving only to justify what has already happened while doing nothing to aid in the long-term operation of the planned system. Even an individual manager carrying out an independent definitional study of this type can become entranced by history and miss the pleasures of contradiction. Strategic plans are not made to be followed, they are made to serve as a focal point for informed discussion.

One approach should be to circulate a set of charts and questionnaires for the responsible supervisors to fill out, followed by a series of informal meetings to analyze the results, discuss areas of overlapping authority, and suggest improvements in the operating efficiency and performance goals of the communications center. This is an opportunity for the upper level communications managers to grill their people and also to justify their ways and means to the departments below them.

Under no circumstances should any department be allowed to wander down its own crooked path. Planning is a cooperative venture. The give and take of information among the high level managers aids in the definition of the system. The environmental analysis will supply projections for a five-year period in most operational areas with a ten-year contingency plan covering only a few selected topics. The general five- and ten-year plans should serve as an aid to the development of operational budgets and yearly forecasts for equipment and manning. Long-range planning, however, cannot substitute for the day-to-day decisions that actually govern the ACD center.

If this suggested format is carried out, either as a group effort or by a responsible individual, it should provide some of the raw material needed to understand the ACD communications center and discover areas in need of improvement.

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SAMPLE LONG-RANGE STRATEGIC PLAN

This plan is to serve as the long-range strategic planning guide for the Brandaxe ACD Communications Center. This plan will address all significant areas of ACD operation for the next five-year period and will address selected topics for the ten-year period. A list of managers and their responsibilities to the plan are given in the outline below. The scheduled dates should be adhered to and each manager will be expected to present and justify their portion of the plan in a stand-up presentation to the communications department in one month.

PLAN REQUIREMENTS

I. System Description
   A. Performance Parameters
      1. Description for System
      2. Derivation of Parameters
      3. Justification of Parameters
      4. Alternative Parameters Considered
   B. ACD Configuration Map
   C. Network Configuration
   D. Traffic Analysis
      1. Current Traffic Analysis
         a. Busy Days
         b. Busy Month
         c. Yearly Traffic Graph
      2. Five-Year Traffic Analysis
      3. Ten-Year Traffic Analysis
      4. Factors Considered
      5. High and Low Traffic Projections
      6. Business Growth Projections

II. Staffing Analysis
   A. Agent Parameters
      1. Description of Parameters
         a. Handled Traffic per Reporting Period
         b. Average Handling Time
         c. Average Work Time
         d. Average Unaccounted Time
      2. Derivation of Parameters
      3. Justification of Parameters
      4. Alternative Parameters Considered
   B. Staff Requirements
      1. Current Requirements
      2. Five-Year Requirements

PLAN REQUIREMENTS
(continued)

III. Trunking Analysis
- A. Trunk Parameters
  - 1. Description of Parameters
    - a. Blocking Probability Cost Analysis
    - b. Blocking As a Function of Staffing
    - c. Traffic Volumes
  - 2. Derivation of Parameters
  - 3. Justificatiion of Parameters
  - 4. Alternative Parameters Considered
- B. Trunking Requirements
  - 1. Five-Year Plan
  - 2. Ten-Year Plan
  - 3. Justification and Analysis
  - 4. Trunk Map and Description
  - 5. Alternative Carriers
  - 6. Cost-Reduction Plan

IV. Network Analysis
- A. Network Configuration
- B. Load-Balancing Objectives
- C. Budget Allocations

V. Financial Analysis
- A. Capital Investment
- B. Return on Investment
- C. Cost Analysis for Five-Year and Ten-Year Projections

SCHEDULE

Day 1 — Presentation of Planning Period Objectives

The complete plan and the instructions will be distributed at this introductory meeting. All responsible managers and their personnel should attend.

Day 7 — General Discussion and Work Sessions

Each manager and their selected people should meet in separate working sessions to present their findings to date and settle on the areas of agreement or disagreement.

Day 14 — Committee of the Planning Session

This should be a general work session with all those involved present to review work to date and trade information where necessary on business growth versus traffic projections or staffing needs as compared to trunking requirements.

Day 21 — Informal Presentation

This session, with all the managers present, should be used to review the nearly completed charts and exchange information.

Day 28 — Formal Presentation

At this session the upper management should be present and the formal recommendations and questioning should be undertaken to finalize the plan. Upper management should approve the plan at some point after this and use it as part of their edicts.

PART IV.

PERFORMANCE PARAMETERS

CHAPTER THIRTEEN

ELEMENTARY TELETRAFFIC ENGINEERING

At the heart of teletraffic engineering there is a great deal of sophisticated mathematics--probability theory, stochastic functions, etc. Fortunately for the ACD manager, it is unnecessary to understand even the smallest portion of this material. The formulas which apply to telephone traffic are all well-tried and generally useful. Even the best of these formulas will only approximate the actual traffic experienced at the ACD, but some are useful for obtaining a rough estimate of the required agents and trunks at various call volumes. The essential problem of teletraffic engineering centers on the delay customers will experience when trying to use a service and their tolerance to delay before they abandon the call.

This is a problem each of us encounters when trying to choose a restaurant and guessing how long we might have to wait based on the popularity of the restaurant. The supermarket owner faces a similar problem when deciding how many checkers to put on the floor. It is uneconomical to have checkers standing idle if there are too few checkers. However, it is bad for business to have long lines of people trying to get service from too few checkers. Teletraffic engineering attempts to reduce this quandary to a mathematical relationship and make an educated guess about the duration of waiting times when varying volumes of people demand a service.

The difficulty with all of these formulas, and the unfortunate flaw in most forecasting packages, is that the formulas assume blocked calls will be held in the delay queue until answered. In an ACD environment the abandoned call rate is a critical factor.

With an ACD all callers do not hang on until their call is answered; in some cases this would mean holding the line for ten to twenty minutes. Abandoned calls significantly lower the traffic load on the ACD, lower the holding times for those who do choose to wait, and decrease the number of staff required. The standard formulas assume that callers will wait until answered. This assumption is matched when the ACD has a very short average speed of answer. If agents are answering calls quickly, no one has to wait so long that they hang up. So, unless the call-handling rate at the ACD produces an

average speed of answer below five or ten seconds, the numbers any of these formulas predict will be inaccurate by a significant margin.

All of these formulas are predicated on the number of calls offered. A closer approximation can be gained by using the number of calls handled in the various formulas. Of course, this procedure requires a close look at the abandoned call reports of the ACD and then a guess as to the abandoned call rate for whatever future period is being considered. If the number of calls abandoned is ignored, any traffic calculations based on the handled calls could completely underestimate the total amount of traffic being lost from the center. A similar situation would occur if a restaurant owner only considered the number of people waiting at the bar and ignored the throngs which peered in the window and left without being served. This approach is limited by the need to guess the handled call rate for any given rate of offered traffic.

Figure IV-1 compares some actual handled traffic for a major airline with the numbers predicted by the Erlang C traffic formula. The Erlang C formula is used as an example to demonstrate the inaccuracy of a formula which does not consider abandoned calls. The Erlang formulas are explained in more detail later in this chapter.

The modern ACD offers a wealth of data which can be substituted for the theories in many cases and produce more accurate forecasting models. Most of the forecasting at well-managed ACD centers is based on such historical data. This type of approach compares past volumes, and the staff required to handle that traffic, with the current volumes. The manager then applies a straightforward division process to predict the traffic and staffing parameters for the new load. This approach has the virtues of simplicity and accuracy, provided the variations in traffic volumes between the present and historical volumes are not substantial. Some forecasting packages use only historical data and make predictions without considering the traffic load for the reporting period actually in progress.

Such historical methods can account for long-range planning where call volumes remain constant, but in a changing environment they fail. Historical methods are particularly unrealistic in the day-to-day operation and real-time management of an ACD center, unless they take real-time conditions into account.

THEORETICAL AND OBSERVED TRAFFIC PATTERNS

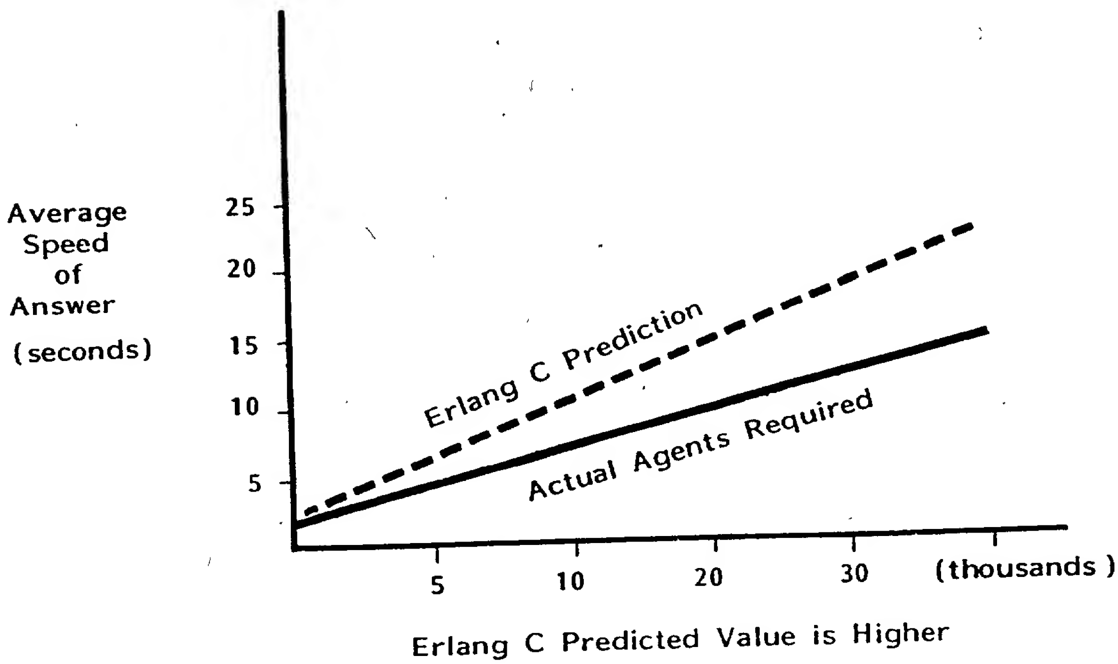


Figure IV-1

The purpose of teletraffic engineering, for the ACD manager, is to determine how long callers will have to wait for an answer given various volumes of traffic and various levels of staffing within the center. These simple formulas can then be used to determine how close the ACD will come to meeting the desired service level--given inputs on the wide variety of factors that affect the call-handling capability of any given ACD.

Traffic engineering typically considers only the busy hours or busy days when estimating the total resources needed to meet a given service level. This method is adequate in toll services and central office planning, but the ACD manager should look at the call-handling volumes in much greater detail throughout the week, the day, and the year.

Graphs of the call volumes for various periods should be prepared and analyzed until the manager is confident that any patterns have been detected which would allow fluctuations in traffic volume to be predicted and handled.

In many ACD's the revenue can approach several hundred dollars a call. It is advantageous under these circumstances, given the flexibility of a modern ACD for configuration changes, to continually monitor the traffic volume and service level and adjust accordingly.

The ACD manager should staff by the shift, by the hour, by the half-hour, or by the lowest increment of time within which changes can economically be made in the staffing. Trunking should be managed to take account of the shortest time period within which trunks can be economically added and dropped from the center--which is around one month for a WATS line and perhaps 60 days for a foreign exchange line.

In order to explain the relevant traffic formulas a few definitions are in order. The number of people available to provide a service, or answer a telephone, is known as the number of "service channels."

The length of time that the customer or caller spends being waited on, or talked to, is known as the "service time"; or, in the case of most ACD's, the "handling time." When this is used to refer to a trunk it is usually called the "holding time." Whichever term is used, it simply means the length of time that a customer is actually using a service channel.

If a customer finds that all the service channels are occupied, he may choose to wait for service, thereby entering a "queue." An ACD will typically have several queues in operation. There will be one queue for incoming trunks which will hold customers while they're waiting for service. There will be other queues which hold agents waiting for calls, hold outgoing calls, or hold requests for transfer calls within or outside the ACD.

The queue is a waiting line and is usually served on a first in first out (FIFO) basis. In the case of trunk queues there also may be priority trunks which are placed in line at the head of the queue. The customers that start waiting first will be served first, as soon as a service channel opens.

The number of calls that enter an ACD is presumed to be random. Any one of several thousand callers might pick up the phone at any instance and place a call. This random feature of telephone traffic is a key assumption in traffic engineering, but this does not mean the traffic is without a pattern altogether. While the individual call initiation is random, the overall pattern of calls received by the ACD takes on a discernible fluctuation which can be graphed through the hour, day, week, month, and year.

If a call is not able to access a service channel immediately, that call is said to be "blocked." A blocked call will either be "held" or "lost." These terms mean just what their names imply: that the caller will stay on the line and be held in the system, or the caller will refuse to wait in the queue, and as the caller abandons the effort of waiting, the call will be lost from the system.

Given these variables and their definitions, it is necessary to examine the application of these statistics. Within the ACD center the manager has the ability to shift people about and consciously manipulate the staffing to account for traffic fluctuations. As mentioned above, the basic teletraffic engineering problem for the ACD manager is determining the traffic density of offered calls to the ACD and then determining the call-handling capability of the ACD given various staffing levels.

TRAFFIC DENSITY

The first item to determine is the traffic density, or the load, on the ACD system. Traffic density at the ACD really has two separate components. There is the density at the trunks, and there is the density at the gates. These figures will be different because of the queuing structure of an ACD.

Typically the ratio of trunks to agents, as defined by the traffic engineering formulas, requires a greater number of trunks than agents in order to meet a desired grade of service. This would imply that an ACD with fifty agents should have around fifty trunks, plus the increment needed for calls delayed on occupied trunks.

There are cases where more agents than trunks will be required. This occurs when there is a very detailed record-keeping function which follows each call. When the after-hang-up work time is longer than the average call-handling time there will be fewer agents than trunks required. Otherwise, the agents will not be able to complete their paperwork before the next call arrives.

ACD's are configured with a trunk to agent ratio based on the economic nature of the incoming traffic. The higher ratios are for non-revenue service ACD's, while the lower ratios are used for revenue centers with larger dollar-per-call income. A higher trunk to agent ratio will increase the efficiency, or answering occupancy, of each individual agent. With more trunks directing calls to each agent group, the possibility that each agent will immediately have another call to answer becomes greater. There are ACD's which operate with a lot of trunks just to insure that the cost of staffing is kept to a minimum in relation to the number of calls answered. This approach provides terrible service, but it may be justifiable if the callers have nowhere else to dial.

This approach reaches its limit when the incremental cost of adding another trunk is greater than the incremental revenue derived from the increased efficiency of the agent force. Another way of finding the proper trunk to agent ratio is to consider the delay cost of the queue. A $ 12,000 a year agent costs about $.33 a minute. The manager should organize the trunk to agent ratio so as to achieve the lowest mix of costs between the delay queue and the agent's time. If the cost of the delay queue (the per minute price of both trunks and abandoned calls) exceeds the cost per minute

of placing an agent to answer those calls, it makes more sense to add the agent. The trunk to agent ratio is determined, just as the service level, by the point of marginal productivity between trunks and agents.

This trunk/agent ratio is decreased in a revenue center, not because the number of trunks is lessened, but because the number of agents is increased. As the revenue per call increases, it becomes more economical to add additional agents. Eventually the addition of agents produces a very small delay queue and the high ratio of trunks is no longer necessary.

In a situation with more traffic channels than servers (agents), the load on the two will be distinct quantities. Of course, the quantities do have a direct effect on each other. If the number of agents required and the number of trunks required are matched very closely to the actual incoming traffic volumes, then this balance can be easily upset. If a few agents take a break at the wrong time, the delay queues will immediately lengthen. If a few trunks cease working, the agents will become less efficient (that is, they will spend a smaller portion of their time actually handling calls).

The traffic which reaches the ACD will occupy its capacity at two points: on the trunks and at the agent consoles. The call-holding time, as shown in the Administrative Data System (ADS), or Management Information System (MIS) reports, indicates the length of time a call has been queued on the trunks and the length of time that the call was occupying an agent's attention.

The handling time combined with the after-hang-up work time for the agents is adequate for determining the staffing levels at the switch. However, this figure does not include the time that the call actually occupied the incoming trunk.

If there are delay recorders on the ACD, then the trunk may have been occupied for ten to thirty seconds prior to answer while the customer was given ringback or music. This period will not be figured into the switch-occupied time on the agent's reports, nor will it be billable time at the ACD itself. To obtain this figure, it is necessary to examine the trunking reports showing an average holding time or an average trunk activity summary. When developing an analysis of the traffic density, these separate areas should be kept in mind.

The number of calls offered to the ACD is essentially a random variable, as is the length of time that those callers will occupy a service channel. The rate at which calls are entering the ACD can be described by the mean frequency of the offered calls.

The mean frequency of offered calls is the average time interval between call initiations to the ACD, as outlined in Figure IV-2. The graph shows that there are an average of thirty calls entering the ACD during any given half hour out of the three half hours shown. Although the actual number of incoming calls varies from 20 to 40 calls during the half-hour period, it is the average offered call rate that is used to determine the density of traffic.

Another important measure is the average length of time a caller is using a service channel. Looking again at the graph of calls during the three half-hour periods, it can be determined that each person calling into the ACD speaks for an average of 180 seconds. Again, there is considerable variation, with some people staying on the telephone 30 seconds and some as much as 500 seconds.

In this example, the ACD is offered thirty calls, on the average, during each half hour with a holding time of 180 seconds per call. The density of traffic at the ACD is obtained by multiplying the average number of calls (during any time period) by the average holding time on the call:

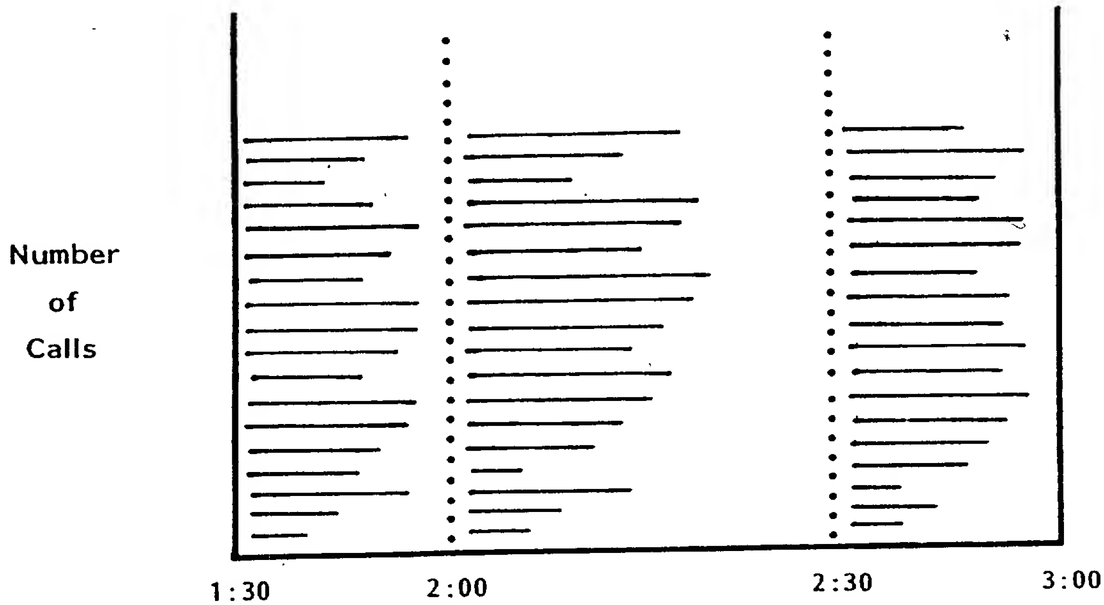
Traffic Intensity = 30 Calls X 180 Seconds

This is equal to 5400 call-seconds of traffic.

Typically this measure of traffic is expressed in two forms with telephony: Erlangs and CCS.

ERLANGS AND CCS

Erlangs are a dimensionless measure of the traffic. An erlang is not associated with any specific length of reporting period. The erlang figure is derived by dividing the number of calls by the length of time during which that traffic intensity was counted. As such, the erlang is simply the "mean" or average traffic density. It is a measure of the average amount of traffic which would be expected at any given moment in the measured period. Since, in this example, there were



Number of Calls and Length Per Half Hour

(Bar equals length of call)

Figure IV-2

30 calls within a half-hour period, the 5400 seconds of traffic intensity are divided by 1800 seconds in the half hour with the result indicatinge there were three erlangs of traffic at the ACD during this period.

CCS (100 call-seconds) is a quantity that is always determined for an hour's worth of traffic. To derive CCS's of traffic from this example, we would take 30 calls X 180 seconds of handling time. This equals, again, 5400. This 5400 seconds indicates that there were 5400 seconds of activity at the ACD during that half hour. The callers were using the ACD service (either talking to agents or waiting in queues for agents) for 5400 seconds of total occupied time. CCS is measured for an hour, so this 5400 is multiplied by two to derive the figure for the hour, which is 10,800 seconds of occupied service time during an hour at the ACD. Because this number is rather cumbersome, the practice in telephony is to report it in CCS, or hundred call-seconds, rather than CS, which would be the total call-seconds. Dividing 10,800 by 100 we see that there are 108 CCS of traffic at the ACD during an average hour-long period.

Both are useful measures. This book will concentrate on traffic measured in erlangs, but the conversion back and forth between the two measurements is straightforward. To convert CCS to erlangs, divide the CCS's of traffic by thirty-six. Erlangs are converted into CCS by multiplying the number of erlangs by thirty-six.

Since most of an ACD manager's staffing decisions are made by the half hour or in real-time, rather than the hour, this book uses Erlang formulas. This allows for a conversion into any unit of time, instead of reporting the figures and making judgements based on an hour-long period. The report packages in the ACD industry mainly use the half hour as the standard reporting period.

Erlangs give an indication of the mean or average traffic density, but this measure alone is not sufficient to effectively manage an ACD center. There must also be some awareness as to how far the values are spread around this average traffic density figure. It is quite a different situation to staff a center with an average of ten erlangs of traffic where that average swings from one call per minute to twenty calls per minute versus staffing a center that always carries ten calls during any given holding period.

A useful measure which provides some indicatioin of the average traffic density spread is called the "variance." The variance equals the average of the mean squared minus the square of the mean. The variance shows the ACD manager how widely the trffic patterns are spread.

Another useful measure which uses the variance is the "variance to mean ratio." The variance to mean ratio is found by dividing the variance by the mean. The variance to mean ratio is useful for the manager in determining the type of traffic that will be offered at the ACD. When the variance to mean is equal to one, the traffic is considered random. If the ratio is not equal to one, the traffic is considered non-random. When the ratio is less than one, the traffic is fairly even and there will be a constant traffic density at the switch. If the ratio is greater than one, the traffic will show wide swings in the load experienced at the ACD.

The "standard deviation" is another measure useful in traffic engineering. This measure is commonly used in the empirical social sciences and is defined as the "square root of the variance." The standard deviation measure is used to determine the accuracy or "confidence level" of any probability function. The standard deviation allows a manager to predict how accurate his or her predictions are likely to be. This is the same type of thing that professional pollsters do when they make their predictions--plus or minus five percent. This usually means that ninety times out of a hundred they will be within five percent of their published figures.

An example taken from an actual ACD report may assist in clarifying the meaning and application of these terms. Consider Figure IV-3, which lists the number of offered calls at the general sales gate of a major airline. This is not a typical application for this procedure. Most traffic engineering texts apply the formulas to the traffic within a one-hour period. The formulas are being applied in the manner described herein to extend their usefulness within the ACD environment.

The average value of the number of calls offered can be computed from this list by adding together the number of calls multiplied by the average handling time and dividing by the interval in the reporting field. This works out to an average of about twenty erlangs of traffic throughout the twenty-one reporting intervals.

TRAFFIC DENSITY FOR ONE DAY

Time	Calls Offered	Average Handling Time
0800	82	158
0830	137	129
0900	139	202
0930	295	157
1000	257	182
1030	336	176
1100	234	196
1130	268	168
1200	226	157
1230	188	151
1300	200	188
1330	197	181
1400	182	196
1430	194	141
1500	200	113
1530	248	152
1600	234	190
1630	210	203
1700	178	208
1730	218	148
1800	132	168

Traffic X Handling Time = Erlangs

82	X	158	=	7.1978
137	X	129	=	9.8183
139	X	202	=	15.5989
295	X	157	=	25.7306
257	X	182	=	29.9855
336	X	176	=	32.8533
234	X	196	=	25.4800
268	X	168	=	25.0133
226	X	157	=	19.7122
188	X	151	=	15.7711
200	X	188	=	20.8889
197	X	181	=	19.8094
182	X	196	=	19.8178
194	X	141	=	15.1967
200	X	113	=	12.5556
248	X	152	=	20.9422
234	X	190	=	24.7000
210	X	203	=	23.6833
178	X	208	=	20.5689
218	X	148	=	17.9244
132	X	168	=	12.3200

Total = 415.5682

Divided by 21 half-hour reporting intervals = 19.788961 Erlangs

Figure IV-3

The lower half of Figure IV-3 provides an example of this computation using the numbers from the gate report for an airline.

Each one of the individual erlang values for any half-hour period has an associated probability function. This probability equals the frequency of the observed value divided by the number of values. It is rather difficult to work with the numbers listed so the table below considers only rounded values for the distribution of erlangs.

FREQUENCY DISTRIBUTION

Freq.	1	1	1	1	1	2	1	3	3	1	3	1	1	1
Value	7	10	12	13	15	16	18	20	21	24	25	26	30	33

Figure IV-4

The probability that there will be twenty calls in progress is computed by dividing the frequency of that value by the total number of possible values. Since there are twenty-one different reporting intervals, there could have been twenty-one different values observed. However, twenty erlangs actually appeared in only three of those intervals. This equals a probability function of three divided by twenty-one or P = .1428.

Such a figure implies that the value of twenty erlangs would be expected to appear about fourteen percent of the time during the average day. This assumes an average day had the same distribution of incoming calls. Since, in the example provided, twenty is also the mean or average erlang number anticipated for this distribution, the manager can expect the ACD to experience that average load about fourteen percent of the time during the day. This average figure does not say enough without also considering the distribution of the traffic around this average figure.

The variance, the variance to mean ratio, and the standard deviation, are used to provide this additional information. Consider Figure IV-5 which lists the same erlang values as the previous table, but with the probability function rather than the observed frequency of occurrence.

Using these rounded numbers, the mean equals the sum of the values multiplied by their probability function, which is 19.9034 erlangs of traffic on the average. The variance is described as the value squared times the probability of that value minus the square of the mean:

$$(7^2 \times .0476 + 10^2 \times .0476 \times \ldots$$
$$33^2 \times .0476) - 19.9034^2 \text{ or } 436.2578 - 396.1453$$

equals a variance of 40.1125.

This implies considerable distribution of the values about the mean, as is obvious from the first chart. Here the variance to mean ratio is the variance divided by the mean or 40.1125/19.9034 or 2.01. From these relatively simple calculations the ACD manager can derive an accurate picture of his traffic flow and begin to staff the center in a scientific manner.

A very large variance implies that money will be lost unless there are wide variations in the number of agents staffed during any half-hour period. A variance to mean ratio less than one indicates that the traffic is smooth and the manager can take less account of variable staffing.

Each of these measures can prove useful if they are used in a variety of experiments to improve the manager's understanding of the traffic characteristics of an individual ACD. The standard deviation, which allows a prediction of the confidence level of various distribution measures, will not be discussed in detail. The books listed in the Bibliography provide the in-depth treatment necessary to fully understand this topic.

PROBABILITY FUNCTIONS

Prob.	.0476	.0476	.0476	.0476	.0476	.0952	.0476	.1429
Value	7	10	12	13	15	16	18	20

Prob.	.1429	.0476	.1429	.0476	.0476	.0476
Value	21	24	25	26	30	33

Figure IV-5

In addition to the intuitive, hand-calculated approach to understanding traffic flows, there are several different formulas used in the analysis of

telephone traffic. For the ACD manager, the two of primary interest are the Erlang B and the Erlang C calculations. There are a number of variations on this theme, most notably the work by Jewett and Schrago on the Extended Erlang tables and the Fast Retrial tables. Their work is highly recommended to any student of this area.

To find the number of trunks required for any given service level, Erlang B is used. In a telephone system that provides waiting queues for delayed callers, the Erlang C formula is used to find the traffic load and the number of servers needed to work off the traffic. In the ACD environment, Erlang C is the primary formula to be used because calls will be held, or queued, on the trunks, as well as inside the ACD while waiting for an agent. Staffing calculations should be based on this.

It should be remembered that these formulas do not account for the abandoned call rate within the queue. The total number of trunks into the ACD from the central office should still be done on the basis of the Erlang B formula (which determines the amount of traffic and trunks required for a telephone service without queuing), since calls that are blocked at the central office will not be held in a delay queue. They will receive a busy tone and be lost from the system until the caller makes a retrial effort.

The Erlang C formula is applicable to multiple server conditions with infinite queue lengths, infinite waiting periods once in the queue, and exponential service times. This formula really does not apply to the ACD where the holding time is expected to flatten out, and where the queue length is expected to reach a known value rather than continually asymptotically.

There are a number of formulas, some which have been explained here, which more closely approximate the conditions in an ACD. There are also computer simulation programs which allow a computer to accurately model traffic conditions within the system.

An introductiion to these topics is included here, though the Bibliography suggests sources for more in-depth research; the importance of continued study cannot be stressed enough. The ACD itself is probably the best source of information. By a careful analysis of the system reports, an accurate estimation of trunking and staffing sometimes can be determined without the use of special formulas.

The critical factors in the use of traffic formulas are the rate at which incoming calls arrive at the ACD and the average length of time those calls will be connected to the ACD. This includes the time spent holding the trunk and the time spent talking with the agent. As discussed above, these two figures provide a measure of the load on the system. For example, imagine there are two calls arriving at the ACD every twenty seconds and that the average handling time for each call is 180 seconds.

The traffic intensity, expressed in erlangs, will be: 1800 seconds in the half-hour reporting period, divided by 20 seconds, and then multiplied by the 2 calls during every 20-second period = 180 calls. This is multiplied by the number of seconds in the average handling period: 180 calls X 180 seconds of handling time = 32,400 call-seconds. The number of call-seconds is then divided by 1800 seconds, the length of the reporting period, to find the number of erlangs of traffic:

32,400/1800 seconds = 18 erlangs of traffic.

Judging from the method by which this number was constructed, it is clear that an erlang simply expresses the average number of calls one could expect in any given holding period. Two calls every twenty seconds is eighteen calls in 180 seconds. Eighteen calls in every given 180-second period is exactly what eighteen erlangs implies.

The convenient thing about this is that it conveys a great deal of information in a single number. The erlang, as a unit of traffic measurement, implies three things about the traffic at the ACD for a traffic intensity of "X" erlangs:

1. That there will be an average of X calls in progress simultaneously at any given time within the ACD.

2. That during the interval of the average handling time there will be X calls originated.

3. That it will require X hours of agent time to work off that volume of traffic.

This measure can also be used in a number of convenient formulas for determining the traffic-handling

capacity and staffing requirements of the ACD center. Most of these formulas have been worked through and tabulated to allow the use of a table instead of a computer or calculator to predict traffic measures. The chapter on forecasting in this book includes some simple routines, written in BASIC, for traffic engineering. Those works on traffic engineering listed in the Bibliography also provide tables used for the various predictions.

With this understanding of traffic intensity, the items of primary interest for the ACD manager include the probability that there will be blocking based on various levels of staffing and the delay customers will experience given different service levels.

Using an example with three erlangs of traffic at the ACD, the following table of delay probabilities, printed in Figure IV-6, can be used to determine the probability of blocking for different staffing levels. This portion of an Erlang C table has already been computed for various levels of blocking.

Running down the left column under the "Erlangs" heading, find the row which runs across from 3.00 erlangs of traffic. The row across the top of the table shows the blocking probability given any number of agents from two to eight. Following across the row from 3.00 erlangs, it is clear that if three agents are used to answer three erlangs of traffic, the probability that there will be blockage on the ACD is 100 percent. Every call that arrives at the ACD will experience some delay before being answered by an agent. If four agents were working, then the delay probability would be percentage corresponds in a rough fashion to the service level of the ACD. With seven agents the probability of blockage is .0377, with around 4 percent of all calls experiencing some delay.

This is intriguing, but not very useful. Most ACD managers are concerned with more than answering all of their calls within some time limit. They are concerned with answering, for instance, 80 % of their calls in twenty seconds or less. This table only shows the probability that some calls will have to wait in queue because they will not be immediately answered. The additional factors can be calculated using the formulas for delay listed at the end of this chapter.

The average delay on all calls equals:

Probability of Delay times
(Average Handling Time /
# of Agents - Erlangs of Traffic)

The delay on delayed calls uses the same formula, but does not multiply by the probability of delay. These two formulas are equivalent to the average speed of answer for the former and the average delay in queue, for the latter.

The Erlang C tables assume that each caller entering the ACD will remain in line until the call is answered. One major advantage to owning an ACD is that the queuing will smooth the traffic flow, hold some callers a reasonable period of time, and allow the ACD to answer a greater number of callers with a smaller number of agents.

By using a greater number of trunks than agents, and packing the calls into the delay queues, the effective occupancy (defined as the percentage of assigned time spent handling calls) of the agents can be raised considerably. This accounts in part for the increased call-handling efficiencies that users experience when they move from an ordinary call-answering center to one controlled by an ACD. The Erlang C formula and delay tables are the most common theoretical measurements for systems which hold callers in a delay queue until answered.

ERLANG C DELAY TABLE

ERLANGS	AGENTS = 2	3	4	5	6	7	8
2.75	.8467	.4095	.1788	.0702	.0248	.0079	.0079
3.00		1.000	.5094	.2362	.0991	.0377	.0130
3.25			.6191	.3026	.1348	.0546	.0201

Figure IV-6

Another important formula for the ACD manager is the Erlang B calculation, listed at the end of this chapter.

The Erlang B calculation provides a theoretical probability that a given traffic intensity will be prevented from using a service channel if there are only a given number of channels assigned.

The Erlang B formula assumes that anyone encountering a busy service channel will be lost from the system, hang up, and allow that service channel to be used by the next caller. Again, the Jewett and Schrago Fast Retrial tables can be used to account for people who immediately redial a lost call.

In the previous formula (Erlang C) the callers were held in queue until answered. The Erlang B formula, and the tables computed from this formula, are useful in determining the number of trunks needed at the ACD. This formula provides a theoretical measure of the blocking or percent of all trunks that will be busy. The service level for trunks assigned at the central office is typically estimated from this formula, or from similar measures.

Of course the electronic ACD will provide the manager with reported values that are much more accurate than the Erlang B or Erlang C formulas, but these are useful tools in forecasting and for initially installing an ACD. They can also be used to determine if the trunks are operating properly. Some ACD's do not provide a direct summary of malfunctioning trunks. However, if the traffic entering the center is out of line with the capacity of the trunks or the expected delay values, this can be a useful starting point for further investigation.

The following example should assist in understanding the application of Erlang B. Assume that ten erlangs of traffic are offered to a group of fifteen trunks. The Erlang B formula can be used to predict the probability that traffic will be lost in this situation, or a computed erlang table can be used.

Consider the portion of an Erlang B table in Figure IV-7 below. Reading across the table for ten erlangs and looking under fifteen trunks, the probability of losing traffic under these conditions is .0365. Almost four percent of the traffic will be lost under these conditions. To find the total lost traffic, the probability of loss is multiplied by the offered traffic. In this case the lost traffic is equal to.365 erlangs. Similarly, if the manager wishes to discover how many

trunks must be added to achieve a probability of loss equal to ten percent for fifteen trunks, the table should be scanned over to .10 and the number of trunks required is shown as thirteen.

ERLANG B TABLE

	Service Channels						
Erlangs	12	13	14	15	16	17	18
10.00	.1632	.1197	.0843	.0568	.0365	.0223	.0130

Figure IV-7

The Erlang B formula, or the tables, can also be used to determine the amount of traffic which will be carried on a series of trunks connected in a rotary. The assumption is made that whatever traffic is lost from the first trunk in a group, as predicted by the erlang loss probability, will overflow to the next trunk. This next trunk will carry an additional portion of the total offered traffic and pass the lost increment on to the next trunk. This procedure continues until there are no more trunks or until all the traffic is carried. The ACD manager can use this procedure to determine how many trunks will be needed to hold all of the customers waiting for an agent to become available. This procedure is fairly straight-forward.

Consider a group of five trunks that is offered ten erlangs of traffic. The Erlang B table in Figure IV-8 shows the following values for the loss probability on each of these five trunks.

ERLANG B LOSS PROBABILITY

	Service Channels						
Erlangs	1	2	3	4	5	6	7
10.00	.9091	.8197	.7321	.6467	.5640	.4845	.4090

Figure IV-8

The first trunk would lose .9091 percent of the traffic offered under these conditions. The first trunk would lose .9091 X 10 erlangs or 9.091 erlangs of traffic. The second trunk would lose .8197 percent of the traffic offered in a group with two service

channels. The second trunk could lose .8197 X 10 erlangs or 8.197 erlangs. The amount of traffic each trunk carries is determined by subtracting the lost traffic from the offered traffic for each trunk. The first trunk would carry ten erlangs minus the 9.0910 erlangs of lost traffic or .909 erlangs. The second trunk would lose 8.197 erlangs of traffic, but it would carry 9.0910 erlangs of offered traffic minus 8.197 or .894 erlangs of traffic. This exercise can be repeated for all of the trunks in the group and the offered, carried, and lost traffic predicted. The traffic lost from the final group is then either lost completely or overflowed to another group. Managers in an ACD environment can use these formulas to their advantage when predicting the number of WATS trunks needed for any particular grade of service.

The efficiency of a trunking or staffing arrangement is an important consideration for the ACD manager. Efficiency is a measure which indicates the percentage of time a service channel is actually carrying traffic. The maximum efficiency of a single channel would be 100 percent. However, no one should attempt to reach this efficiency level because there is a trade-off between efficiency and the probability of blockage on a trunk. To reach this 100 percent efficiency level would require that there be 100 percent blockage on the service channel. Some customers would always have to be backed up waiting for service. Efficiency is a good indication of the utilization of the service channels, but a poor measure of the quality of service presented to the customers. Efficiency and the probability of blockage must be considered together to get a realistic estimate of the call-handling performance of the ACD center.

Look at the efficiency of a group of twenty trunks which are clearing blocked calls with a blocking probability of .05. The formula for determining this is as follows:

$$\text{Efficiency} = \frac{\text{Erlangs}}{\text{\# of Trunks}} (1 - \text{Blocking Probability})$$

The table of erlang values shows that twenty trunks with a blocking probability of two percent (.02) can carry a maximum of 13.0 erlangs of traffic. The efficiency of this trunk group is then 63.7 percent. This calculation can be repeated for a range of trunk sizes and plotted to determine the efficiency of larger or smaller trunk groups. Such an exercise will show that larger trunk groups carry traffic more efficiently than do the smaller groups. The blocking probability can be held constant while the size of the group is

increased to improve the efficiency level of the trunk group. There is a limit to this exercise. Unfortunately, the efficiency of large groups only holds if they are engineered to avoid overload conditions. If, in a trunk group with twenty lines engineered for a blocking probability of .02, an overload condition of twenty percent is applied, the blocking probability for those twenty trunks rises dramatically to .0534. The blocking probability increases by over two and one half when the traffic intensity is increased by twenty percent.

The same condition will be observed in a group of agents. There are many ACD's which are operating near peak efficiency; the agents are handling calls without any slack time between calls. This situation can lead to massive overloads if a burst of calls hits an ACD which is so finely tuned that the agents are always busy. Such an overload condition will be alleviated slightly by the increasing rate at which customers drop out of the delay queue as the wait gets significantly longer.

The manager must be careful to engineer the trunks and staffing of the ACD center in order to obtain the highest efficiency within the defined service level--while at the same time keeping in mind the effect that bursts of overload traffic will have on any given configuration. A group of curves should be outlined that show the average and maximum traffic. The trunking and staffing configurations can then be plotted against these curves to insure that the trade-offs between efficiency and service level do not result in overloads on the switch. The ACD will also allow the use of overflow groups within the switch to handle excessive traffic inflows. The use of secondary agent groups, and overflow/diversion tie lines between multi-node ACD's, can provide for larger simulated traffic-carrying groups and greatly increase the efficiencies of the agent force.

The delay times in the system are considered in two ways. These times may be calculated for all the calls that are handled, or calculated only on those calls that are delayed. The calculation should be done both ways to get a more accurate view of the service level.

The delay calculated on all calls averages in those calls which experience zero delay and so presents a more optimistic view of the call-handling rate. The delay time calculated for only the delayed calls ignores the calls that were answered immediately, and provides some idea as to how long the hapless people in the queue waited for your agents to rescue them. There

Probability of Queue Length Exceeding A Specified Value

$= (a/c)^{q_x}$ Prob of Delay

Binomial distribution indicates the total number of lines that will be busy at a given time.

Probability of z busy lines out of the total number of lines

$= \frac{s!}{z\, x!(s-x)!}$ x probability of one line busy^z(1 - prob)total lines minus

where: h = probability of one line busy
x = variable number of lines that may be busy
s = total lines

then: $B'(x,s,h) = \frac{s!}{x!(s-x)!} h^x(1-h)^{s-x}$

For the binomial distribution:

Mean = sh
Variance = sh(1-h)
VMR = (1-h) or v/m

CHAPTER FOURTEEN

BASIC ACD ECONOMIC ANALYSIS

The ACD manager may or may not be directly involved in the final budgeting decisions. In almost all cases the manager will have a peripheral hand in this activity and should possess at least a basic understanding of the budgeting process and the fundamentals of economic analysis which determine the worth of a capital expenditure.

Capital expenditures, in particular investments for replacement equipment or modifications to existing facilities, will require the top communications manager's involvement. The ACD manager will continually be faced with decisions about expanding the present ACD or buying a replacement machine, hiring agents or adding trunks, increasing or decreasing the service level. For this reason each manager must be capable of determining the worth of any investment, or at least be able to direct the finance department in the production of investment analyses.

Capital expenditures are used to procure the assets of the ACD center which are applied to the production of revenue. The budget is a plan which shows the flow of money into and from the center over some period of time. The ACD is normally expected to provide revenue or a revenue assistance service for a ten-year period (with occasional software enhancements to the basic architecture). For this reason it is necessary to complete the ten-year capital expenditure planning and determine the cash flow for the life of the equipment. Since the ACD is a fairly long-lived asset, it is necessary to consider discounting, over its life cycle, the effects of inflation and the lost opportunity costs.

There are five general steps that apply to any analysis of a capital expenditure. First, the expected cash flows are estimated, including the estimated salvage value of the asset at the end of its life cycle. Next, the riskiness of these projected cash flows is estimated. An appropriate discount rate, called the cost of capital, is chosen. The expected cash flows are discounted through the present value method. This calculated value is compared to the cost

can be an enormous variation between the actual delay on all calls (better known as the average speed of answer), and the average delay on all the delayed calls.

There are several values describing the activity of an ACD system with delay-call queuing that are useful:

1. The probability that a caller will have to wait.

2. The probability of a caller waiting longer than a specific time period.

3. The probability that all the service channels and queue slots will be busy.

4. The average delay on all calls.

5. The probability of a queue length equal or exceeding some value.

6. The average queue length.

These relevant formulas are listed below.

The assumption of random call arrival from an infinite number of originating sources is made in this section so that the more common formulas may be applied. The service time in an ACD is more constant than exponential because the calls to ACD agents tend to group around known holding times. However, the exponential assumption is used because this is simpler to manipulate mathematically.

The administrative reports of the electronic ACD have eliminated the need for much of the tedious work involved in traffic engineering, but these skills are still necessary for forecasting against future volumes and for mathematical experiments with different system configurations. For these reasons the manager should not be content with this brief introduction. The ACD provides an excellent source of material for testing various formulas against observed data. Experimentation with these formulas should result in greater comprehension of, and appreciation for, the complexities of traffic characteristics of the ACD.

APPLICABLE FORMULAS

In these formulas:

- c = the number of agents or trunks (service channels)
- h = the average holding time
- a = the traffic in erlangs.

Probability of Delay

$$P(/0) = \frac{\frac{a^c}{c!}\,\frac{c}{c-a}}{1 + a + \frac{a^2}{2!} + \ldots + \frac{a^c}{c!}\,\frac{c}{c-a}}$$

This can be found more readily by scanning through the Erlang C table and locating the probability of delay underneath the appropriate traffic density and the number of agents.

Probability of Loss

$$P = \frac{\frac{a^c}{c!}}{1 + a + \frac{a^2}{2!} + \ldots + \frac{a^c}{c!}\,\frac{c}{c-a}}$$

Probability of Delay in Excess of a Specified Time Interval

$$P(/t) = (\text{Prob. of Delay})\,e^{-(c-a)t/h}$$

Probability of Loss in a Loss-Delay System

$$\text{Loss} = \frac{a^q}{\frac{1}{B} + \frac{a(1-a^q)}{1-a}}$$

where q is the length of the queue and B is the Erlang B formula

Average Delay on All Calls

$$\text{Avg Delay} = \text{Prob of Delay} * \frac{h}{c-a}$$

Average Delay on Delayed Calls

$$\text{Delayed Delay} = \frac{h}{c-a}$$

Average Length of the Queue

$$= \text{Prob of Delay} * \frac{a}{c-a}$$

of the project. If the asset's present value exceeds its cost, and the value of similar projects, the project is accepted. Finally, the effect of the capital budgeting process on the firm's value is considered. If the present value of the sum of the firm's projects is positive, the company will increase in value. The worth of an ACD should be compared to the overall worth of the firm. An estimate should be prepared of the additional revenue which will be generated by other departments because of the ACD. This will help accurately determine the total value of an improved communications center.

The first step, estimating the cash flow from an ACD equipment expenditure or replacement project, involves a fairly complex analysis. There are a great many intuitive factors that cannot be accounted for directly and will have to be weighed according to the manager's intelligent guesswork.

Income statements should be prepared showing the expected cash flow during each year of the equipment's projected life. The revenue generated from this equipment, as computed for the projected traffic volumes over the ten-year cycle, and the direct costs of operating the equipment are subtracted. Depreciation, if the equipment is purchased, should then be added back into the bottom line.

The cash flow estimates are prone to error. The manager should be particularly careful in this area because any mistakes will be magnified throughout the planning process. The simplest type of comparison is to take an estimated set of revenue figures then play these figures against the operating costs and capital equipment costs of a variety of ACD's. This procedure is used to determine which vendor's equipment would be the "best buy." The difficulty with this is that the features and optional capabilities of the different ACD's are difficult to compare in terms of the revenue they might generate or the operating expenses they might save.

An analysis of different ACD's would have to include such things as trunk savings for a multi-node versus a single-node system, intelligent interflow balancing versus a straight queue dump, and multi-choice queuing routines versus a fixed choice FIFO routine. The actual expenses and revenues from these items are not immediately obvious. Some effort will have to be made to include such considerations. A machine with an attractive cash flow which cannot perform all the funtions eventually demanded of it is no bargain. In almost all cases, there will be some

equivalent communications service available on the premises from the telephone company. The costs and revenues from this equipment can be used as a base line for considering the acquisition of other ACD equipment.

Once the cash flow has been estimated, it is necessary to consider an analysis of the fairly straightforward risks involved in the purchase of an ACD:

1. The equipment may not work.
2. Revenue may dip from a loss of business due to other factors.

There is not too much the ACD manager can do about the second factor. As for the first, there are both horror and success stories. The alert manager will spend enough time at trade shows and vendor installations to know who's marketing hot air and which vendor will dispatch a serviceman rather than a service manual and a left-handed screwdriver.

There is some risk analysis necessary with an ACD that is being built to meet future traffic volumes. The airlines are typically sophis- ticated enough to order their equipment two or three years in advance --based on their projected bookings. The really innovative airline communications manager works closely with the suppliers and takes considerable risks on new development projects. The payback from such developments can greatly outweigh the financial risks. In most cases the traffic volumes can be estimated at a six-month or yearly interval and--assuming there is adequate floor space for expansion--the ACD equipment can be delivered without much problem.

All of the ACD's on the market are modular and allow for expansion in an economical fashion, to within their advertised line sizes, but no greater. So long as the manager insures enough excess capacity to account for an average eight-month traffic volume growth there should be little difficulty with additional risk analysis. One problem, which involves a different type of risk, and which everyone wishes they had, is a major concern at PEOPLE. Their growth rate is so fast that keeping adequate equipment on order requires constant attention to the corporation's expansion.

Once the cash flow and risk analysis is complete, the actual cost of the money required to purchase and operate the ACD should be considered. Typically the finance department will present the ACD manager with this figure and there is no need to be completely

familiar with the procedure. The important point to understand is that each project can be given an average cost of capital which accurately reflects conditions within that project's life cycle. There is no need to accept a figure dictated by the corporation's financial officers for all projects if the ACD risk is minimal, or if there will be considerable fluctuations in the cost of capital during the project's duration. In brief, the cost of capital is the cost incurred by a firm to raise funds during the project period. The cost of capital for a corporation is an average of the cost of debt and the cost of stock, weighed by the ratio of debt to equity.

The average cost of capital, through the life cycle of the ACD equipment, is used to develop the actual cost of the capital expenditure. Based on the risk analysis, this average cost of capital should be raised, lowered, or left at the average rate. In the case of capital expenditures for an ACD, a low risk average cost of capital should be used as there is little chance of losing money on the investment. If the average cost of capital over the ten-year life cycle is fourteen percent, the ACD expenditure should be analyzed at a rate around eleven or thirteen percent to account for the low risk.

Generally, the communications manager will not be involved in any analysis of the cost of capital and this number can be obtained from the financial department. The cost of capital is a shortened form for two related concepts. The cost of capital is used to refer either to the return on investment required to maintain a firm's market value, or the return on the investment rate which the firm can realize through other capital expenditures. The latter is sometimes called the "opportunity cost" of an investment. If a firm can gain a twenty-five percent return on its investment capital by purchasing additional airplanes, it will not put money into an ACD (even assuming a positive present value rate). Because the cost of capital is eighteen percent, the borrowed money will probably be invested elsewhere for a higher return. An ACD purchasing decision must compete with other investment opportunities at the full capital cost or required return rate. Leasing ACD equipment can often be accomplished at lower interest rates than the firm could obtain by borrowing the money for a cash purchase. The leverage of larger firms may result in savings through this type of purchase agreement.

The average cost of capital can then be used in the financial evaluation of the project through a Payback Period analysis or a Net Present Value analysis. The

cash outflow and inflow from a business will occur over different periods and in varying amounts. This increases the difficulty of analyzing the worth of several competing investment opportunities. One ACD vendor may offer equipment immediately. Another vendor may require twelve months before installation. Ordering the first vendor's ACD means an immediate retirement of the inefficient equipment, but the second ACD may offer greater efficiency once installed. Deciding which is the most attractive investment is not always obvious. However, the Net Present Value methods and the cash flow analysis can account for the variable investment costs and opportunities.

Most corporations require a minimum Payback Period as well as a positive Net Present Value figure. These two forms of financial analysis are the accepted methods in modern finance.

The Payback Period indicates the number of years within which the original investment will be paid back by the revenue or savings generated by the initial expenditure. Net Present Value is the present value of the expected future returns on the investment. Net Present Value takes into account the cost of capital over the life of the project.

Initial Investment in Both ACD A & ACD B = $1,000,000
Net Cash Flow (In Thousands)
= Profit After Taxes Plus Depreciation

Year	ACD A	ACD B
1	$400	$100
2	280	200
3	260	300
4	90	400

In the example above, the expenditure on ACD A is paid back in less than four years. The expenditure on ACD B takes longer to pay off, but it is increasing in revenue value over its life cycle. The Payback Period method only analyzes the length of time required for payback. It does not consider what happens to the profitability of the equipment beyond this period.

Some of the flaws in the Payback Period method are corrected by applying the Net Present Value analysis. Most modern business calculators have Net Present Value keys and calculation is easy.

The formula for Net Present Value is:

$$NPV = \frac{R^1}{(1+k)^1} + \frac{R^2}{(1+k)^2} + \cdots + \frac{R^n}{(1+k)^n} - C$$

Where: R represents the net cash flow per year
k is the cost of capital
C is the initial cost of the ACD expenditure
n is the project's expected life cycle

The project's cash flow is the "amount by which the project's incremental effect on revenues exceeds the project's incremental effect on costs." As this formula indicates, there is no need to refer to Net Present Value tables to find the present value factor. The denominator of the equation $(1+k)^1 \ldots (1+k)^n$ allows the present value factor to be calculated for any number of years at any given cost of capital (k). This denominator is then divided into "one" to obtain the discounted cost of capital--the present value factor.

For example, if the cost of capital is twenty percent, then the present value factor for the tenth year would be $(1+k)^n$ or $(1+.20)^{10}$ which is $(1.20)^{10}$ or 6.1917. Dividing this into one gives 1/6.1917 or .1615. This means that a dollar, at twenty percent inflation, is worth about sixteen cents at the end of ten years. Tables are available in any finance textbook if needed. The formula listed is useful if a Net Present Value computation is programmed into a hand calculator or desk-top computer.

This formula discounts the net cash flow of the ACD investment against the cost of the investment capital and subtracts the initial cost of the project. This method provides an indication as to whether the project has a positive or negative Net Present Value. Only those projects with a positive present value should be undertaken. Comparing two projects, the one with the higher Net Present Value should be pursued.

Another method of discounting cash flows to analyze investment decisions is the Internal Rate of Return, or Time Adjusted Return, method. The Internal Rate of Return is very similar to Net Present Value. The Internal Rate of Return is the discount rate which would have to be factored in to reach a Net Present Value of zero. Internal Rate of Return determines what the cost of capital must be to find the equilibrium point for an investment. If the discount rate found through Internal Rate of Return is greater than the

percentage factor the firm requires to justify an investment, then the project should be undertaken. Any project which shows an Internal Rate of Return greater than zero is considered a good investment, but most companies require some increment above this to allow for contingencies. Internal Rate of Return analyses can be done by trial and error or predicted by a business analyst's hand calculator.

An example of the Net Present Value analysis is outlined below in Figure IV-9. In this example the manager is choosing a purchased ACD over a ten-year period.

NET PRESENT VALUE
(IN DOLLARS)

YEAR	SIGNIFICANT EVENTS	CASH FLOW (In 100 Thousands)			PRESENT VALUE 25% Rate	
		EXPENSES	REVENUE	NET	FACTOR	PV OF CASH FLOW
0	Purchase	900	300	(600)	1.000	(600)
1		150	350	200	.800	160
2		100	350	200	.640	128
3		100	350	200	.512	102.4
4		100	350	200	.410	82
5		150	450	200	.328	98.4
6	Expansion	750	450	(300)	.262	(78.6)
7		200	450	250	.210	52.5
8		250	450	250	.168	42
9		100	500	400	.134	53.6
10		100	550	450	.107	48.15
	Totals	1800	4550	2750		
				Net Present Value		88.45

Figure IV-9

RESOURCE ALLOCATION & COST MINIMIZATION

All of the procedures discussed above can be extremely helpful when making investment decisions. Additional methods of economic analysis quite useful in the ACD environment are concerned with resource allocation and cost minimization.

A typical resource allocation problem involves decisions about whether or not to add an additional agent, an additional console, or an additional feature. In these examples the manager is faced with analyzing a single input with constant marginal

product. Constant marginal product implies that for each additional unit added to the ACD there will be a corresponding increase in output at the ACD.

This increase in productivity will be equal for each input (or agent, etc.). If the addition of one agent results in an increase of revenues by one-tenth percent, then the addition of five agents would result in a revenue increase of five-tenths percent--under the assumptions of constant marginal product.

Given this type of relationship the manager would add additional agents until some limit is reached, such as the total operating budget, the offered traffic ceiling, or the ACD's expansion capacity. The equivalent value of adding each agent is computed by multiplying the agent's marginal revenue by the increased productivity. If each call is worth one hundred dollars, then adding five agents would produce an additional five hundred dollars times the number of additional calls handled during the working period. The total revenue produced would be the marginal revenue product minus the cost of the agents. If an agent (and the associated overhead and equipment) costs less than the additional revenue production, the manager should obviously add as many agents as possible.

There are some additional twists to this type of analysis. Even though the addition of each agent produces an increment of revenue gain for the center, there can be other factors which make hiring uneconomical.

For example, adding twenty agents may cost little in terms of floor space, trunks, termination cards, and additional supervisory overhead. Adding an additional ten after that may require knocking out a wall, hiring another supervisor, and putting another termination cabinet on the ACD. The costs associated with additional inputs, even under the assumption of constant marginal product, must be factored into any resource allocation decision.

Another variation is that there will often be several competing uses for any given input. Additional agents could be placed in either the credit services gate or the customer applications gate. Suppose that agents in the credit services gate produce revenue of ten dollars per call, while agents in customer allocations product five dollars per call. The tendency is to increase the number of agents in credit services as quickly as possible. However, there is a limit to the number of calls which need to be handled

in credit services. The agents would be assigned to credit services until that limit was reached, then the application gate would be staffed.

In most cases the ACD manager will not be operating under the assumptions of constant marginal product. Each agent does not add a constant amount to the production of the call center revenue. The ACD operates under the assumption of decreasing marginal revenue. In this case each additional productive unit will, up to some point, increase revenue, but the additional units will increase revenue by a smaller and smaller amount. This would be the case where the ACD was approaching some maximum capacity for offered traffic and the additional agents or trunks would not significantly improve the handled traffic rate. However, given the vagaries of telephone traffic, there will also be cases of increasing marginal product. For instance, the addition of agents to an understaffed group, or the creation of a more efficient large group out of several small ones, will result in a greater amount of traffic being handled per agent and an increase in the marginal product.

There are analytical solutions to resource allocation problems which can be found in the works listed in the Bibliography. These solutions may be quite complex and very powerful. A study of the methods suggested in Managerial Economics, Henry and Haynes, is well worth the effort. However, for the purposes of this book, a simpler solution that yields essentially the same results--by means of a more cumbersome procedure--will be discussed.

INCREMENTAL REASONING

For a resource allocation problem which involves the maximization of revenue at the ACD gates, the process of incremental reasoning can be applied. This method considers the increase of revenue for each additional agent in the gate and determines whether the cost of adding that agent was greater than the increment of returned revenue. When a point is reached where the additional revenue is less than the cost of the input required to achieve that additional revenue, the manager knows that the maximum revenue-production point has been attained.

Figure IV-10 displays the work sheet for such a problem. The number of calls answered was derived theoretically by assuming that 1600 calls per day, at a ten erlang per half-hour rate, would be offered to the gate. This was multiplied by the Erlang B probability

REVENUE MAXIMIZATION

Calls Handld	# Of Agents	Labor Cost	Trunk Cost	Gross Revenue	Net Revenue	Icr Rtn	Er B	Er C
145.44	1	$160	$1200	$1454	$ 94	$ 94	.9091	
288.48	2	320	1200	2884	1364	1270	.8197	
428.64	3	480	1200	4286	2606	1242	.7321	
565.28	4	640	1200	5652	3812	1206	.6467	
697.60	5	800	1200	6976	4976	1164	.5640	
824.80	6	960	1200	8248	6080	1112	.4845	
945.60	7	1120	1200	9456	7136	1056	.4080	
1058.72	8	1280	1200	10587	8107	971	.3383	
1162.64	9	1440	1200	11626	8986	879	.2732	
1256.64	10	1600	1200	12566	9766	780	.2146	1.00
1338.88	11	1760	1200	13388	10428	662	.1632	.6821
1408.88	12	1920	1200	14088	10968	540	.1197	.4494
1465.12	13	2080	1200	14651	11371	403	.0843	.2853
1509.12	14	2240	1200	15091	11651	280	.0568	.1741
1541.60	15	2400	1200	15416	11816	165	.0365	.1020
1564.32	16	2560	1200	15643	11883	67*	.0223	
1579.20	17	2720	1200	15792			.0130	
1588.64	18	2880	1200	15886			.0071	
1593.92	19	3040	1200	15939			.0038	
1596.96	20	3200	1200	15969			.0019	

This simulation assumes 1600 calls offered per eight-hour working day with an average handling time of 180 seconds. The trunk costs are fixed at 1200 dollars per day.

*Break Point for Agent Additions

Figure IV-10

figure to derive an answered calls number. In practical applications the numbers found in the ACD reports should be used. The number of agents varies from one to twenty. The labor costs for agents is set at twenty dollars an hour to include salary, equipment, and administrative overhead. The trunk costs were assumed to be $26,400 per month, or $1200 per day, for a maximum of twenty trunks.

This simulation could be calculated using variable trunk costs, but the maximum expected value is simpler to work with and provides the increased agent efficiencies at the low end, which may benefit some ACD centers. The gross revenue is figured by assuming each call averages ten dollars in revenue. Of course some calls will be more, some produce no revenue, but the average for this center is ten dollars. The net revenue is simply the gross minus the expenses for trunks and agents. The next field, labeled "Icr Rtn," is the "incremental return" for each additional agent. This is net revenue minus the previous net revenue.

This field shows the amount of additional revenue produced by each additional agent. Once the fifteenth agent is added, the maximum revenue has been obtained. Adding the sixteenth agent lowers the incremental revenue below the $160 cost of an additional agent. At this point it becomes uneconomical to load the system any more.

The Erlang B and Erlang C fields show the predicted service level which would be achieved by these combinations of trunks and agents. On a working site the ACD reports should be substituted for the theoretical values. Many different combinations of agents and trunks can be modeled in this manner and the most economical approach discovered quickly. The Erlang B column will indicate how much traffic is being lost or overflowed. If the breakpoint on agents is quite low, it may be necessary to recalculate the model using a greater number of trunks. The larger number of trunks will have the effect of increasing the occupancy of the agents and improving the return on revenue for each additional agent. The number of trunks should not be increased beyond some factor times the predicted maximum number of calls offered during the study period. This factor must be estimated according to the incremental return from the increased occupancy minus the incremental cost of the additional trunk.

This is a simple way of predicting exactly what effect each combination of trunks and agents will have on the revenue production of the ACD. It should also be noted that the service levels at this maximum

revenue-production breakpoint are still high. Using the formulas from the previous chapter demonstrates that the predicted delay on all calls will be less than five seconds and the delay on delayed calls will be less than thirty-six seconds. This is a better service level that most ACD's require, and yet it is still a revenue-maximizing point. In an ACD where the revenue per call approaches one or two hundred dollars, the service level would be less important than finding this breakpoint and staffing accordingly. Very low service levels are mandatory to achieve the maximum in economic efficiency from the ACD when the revenue per call is high.

This type of analysis must be conducted for different periods of the day and different days during the year. In an ACD which does not experience the smooth traffic applied in this model, the analysis becomes more complicated. Depending on hiring practices, the ACD will have to be optimized either for an average traffic load or within each segment of the day. If the ACD is optimized over the entire day, this will produce lower service levels at the breakpoint in order to balance the diseconomies experienced during low traffic periods.

In addition to resource allocation problems the ACD manager will be faced with product mix dilemmas. These arise when two or more gates require additional agents or trunks, but it is not known what application will produce the maximum revenue. This is distinct from the revenue maximization problem presented above because an efficient product mix concerns the application of two or more resources which are interdependent. Adding one agent to the Tours gate will take one agent away from the General Sales gate.

LINEAR PROGRAMMING

A common method used in economics to determine product mixes is linear programming. This method requires the assumption of linearity between the variables. It has to be assumed that the addition of one unit of production will produce a corresponding increase in the output and that this increase will hold for a given range of additional inputs.

This is the same assumption discussed under the section on constant marginal productivity. This assumption can be useful if the ranges over which it is used are reasonably limited. In order to formulate a problem in linear programming, it is necessary to state the performance objectives of the ACD center as a

linear function.

To make the basic approach clear, take the example of two gates with a known number of assigned agents and a different revenue-production function at each gate. The ACD is configured such that each caller must be screened by the first gate and then transferred to the appropriate agents in the next gate. The ACD is a promotion center selling opera records and rock records via an 800 number advertised on television. Each opera record sells for twenty dollars and each rock album sells for twelve dollars. Due to differences in the calling rate, it requires one agent in Gate A and two agents in Gate B, on the average, to make each opera record sale per gate. For the rock albums, it requires ten agents in Gate A and five agents in Gate B to make each sale. There are twenty agents working in Gate A and forty agents working in Gate B. The stated objective would be:

Maximize: REVENUE = 20 Opera + 12 Rock

The next step is to state the limitations on this revenue production as a linear equality. Naturally enough there are constraints on how much revenue can be produced at either of these gates. These constraints are imposed by the available time, the total number of callers, the space available for extra agents, training, etc. The constraints in this case are set by the number of agents required in each gate to handle the transaction.

Assuming the agents can be moved back and forth between Gate A and Gate B, the linear constraint functions would be:

1. 10 Rock + 1 Opera is equal to or less than 20
2. 5 Rock + 2 Opera is equal to or less than 40

These constraints are then solved as a simultaneous equation to obtain the number of opera and rock albums which should be sold to produce the maximum revenue from this ACD operation.

$$\begin{aligned} 10\ \text{Rock} + 1\ \text{Opera} &= 20 \\ 5\ \text{Rock} + 2\ \text{Opera} &= 40 \end{aligned}$$

The second equation is multiplied by -2 to solve for the opera value.

$$\begin{array}{r} 10\ \text{Rock} + 1\ \text{Opera} = 20 \\ \underline{-10\ \text{Rock} - 4\ \text{Opera} = -80} \\ -3\ \text{Opera} = -60 \end{array}$$

This solution is then inserted into the first equation to solve for the rock value.

10 Rock + 1(20) = 20
10 Rock = 0
Rock = 0

The values for rock and opera are then substituted into the original maximizing equation and the solution is:

Revenue = 4 Opera + 12 Rock or 4(20) + 12(0) = 80 dollars of maximum revenue

to be derived by selling only opera albums. Obviously, this is the maximum amount of money the ACD can produce from this mix of inputs and the rock albums should not be sold at all.

This is a highly simplified example, but the same principle can be applied anywhere in the ACD that two or more resources are required to produce one output and the mix of inputs must be maximized.

The importance of using economic principles in establishing the configuration of an ACD center cannot be overemphasized. The service level should be a function of the ACD's optimal revenue state; the service level should not be allowed to drive the ACD operation without reference to an objective standard. The production of an optimal return on investment is a much clearer and more easily analyzed quantity than a simple desire to answer such and such a percentage of calls within some arbitrary interval.

CHAPTER FIFTEEN

DEFINING SYSTEM PARAMETERS

The key performance parameters established for gates, trunks, and agents determine the call-handling capability of the ACD system. This section will consider performance parameters for the system in general and for the gates, with subsequent sections covering trunks, agents, and the network. "Gates" are the same as the "splits" of AT&T, or the "groups" of IBM-Rolm. A gate is simply a collection of trunks and their associated group of answering agents.

The ACD gate is much like a gate in a train station. It is an avenue through which a large volume of traffic passes to reach its destination. Most of the ACD's discussed herein will be capable of having several gates, or call-handling areas, set aside. The Rockwell system offers a maximum of 32 gates, and the Teknekron Infoswitch^{R}, for instance, allows fifteen functional separations within the call stream.

Each of these gates is typically assigned to one homogeneous call-handling function. The reason for this is that calls are evenly distributed within each gate only for the specific trunk bundles that terminate at that gate. Keep in mind the type of automatic call distribution that is offered by each vendor.

The most obvious distinction is between automatic distribution and uniform distribution. With automatic distribution, calls are assigned to agents based on the length of time any given agent within a gate has been idle between calls. The agent who has been idle and available the longest will be assigned the next call. This insures an even distribution of the workload among the agent force. However, this only applies within a given gate. Each gate has automatic distribution--hence, even workloads--but there will be uneven distribution between different gates because the inflow of traffic to the different gates is distinct and the distribution scheme is only even within a gate.

The other type of distribution mechanism is "uniform call distribution." The confusing aspect of this is that both automatic and uniform distribution schemes are sold in machines that are labeled "automatic call distributors." Unlike automatic distribution, uniform distribution does not provide an even balancing of the work among the agent force. The AT&T ACD, the IBM-Rolm CBX, and the Teknekron INFOSWITCH[R] are uniform call distributors. This means that agents are assigned calls based on a rotary. The next agent in the rotary will receive the next available call--not the agent who has been idle the longest. The INFOSWITCH[R] allows for this uneven balancing by allowing a dynamic reconfiguration of agents on a regular basis. This will move agents out of the "hot" seat and into another section of the rotary that is not hit with calls quite so often. The manager should be aware of the type of distribution in order to account for these hot spots.

In the special cases of gate interflow, or secondary assignments between gates and multi-node overflow, there is some additional balancing effect between gates, but the only way to insure an even distribution of calls is to group agents within a single gate. Interflow refers to ACD systems which allow calls to be handled by a back-up agent in another gate if the primary agents who would normally handle the calls are busy. Again, this mechanism varies from machine to machine. The Wescom ACD and the Teknekron ACD have programmable incoming call routines which allow the user to program in a series of steps to determine where the call should look and how long the delay should be between successive steps. The Rockwell ACD does not have this mechanism and provides interflow by immediately looking for a primary agent when an incoming call is recognized. If there are no primary agents available, this ACD immediately looks for a secondary agent. Failing in this, the call drops into a waiting queue and the Rockwell ACD continues to look for either a primary or a secondary agent until the call is answered or abandoned.

The actual operation of the gate, at the software level, should be understood by the manager in order to effectively determine the service levels and performance parameters for the various gates. The ACD manager should exert a strong influence on the actual performance levels the ACD is expected to attain. In order to exercise this influence a careful study of the existing and future performance parameters must be undertaken.

Choosing and enforcing a rational set of perfor-

mance parameters for the ACD is one of the most mysterious and most important aspects of effective management. In ACD sites across the country, from the largest Rockwell International dual ACD to the smallest Teknekron machine, there is a universal chorus of shrugged shoulders when performance criteria are questioned. The performance criteria for the system, the agents, and the trunks, are either arbitrary or handed down from a management roost that is far from the nuts and bolts of the communications operation.

Establishing performance parameters is the single most important thing an ACD manager can do--provided it is done well. There is little in the ACD that is not shaped and driven by the service level. There is little that is not affected by the manager's decisions in this critical area.

It is at the gate level that the actual real-time and historical call-handling statistics for the ACD system are collected. It is at this demarcation point that the most important events take place. This is the first chance the caller has to bristle at a delay announcement or be shunted off to a half hour of delay queue "easy listening." This is the area within which the caller on your WATS can sit and burn up expensive minutes waiting for an agent. This is the interface between your ACD and the outside world. It is here that the customer measures the quality of your service and makes the initial decision that your service is good, lousy, and indicative of still worse to come. It is at the gate level that trunks and agents interface and determine the actual quality of service the ACD center is offering the outside world.

Knowing the importance of this interface and sensing the need for a close, accurate, and critical analysis of those calls wandering in that no-man's land between seizure of the trunks and "Hello. May I help you?" is crucial. But there remain the questions," What exactly should I know about this area?," " What types of things can I know about this area?," and "How good is good enough for those callers vying for service?"

The ACD manager should know three things about the call-handling process at the gate level. The manager should know the functional configuration of the switch, the volume of traffic, and the efficacy of the call-handling service levels.

FUNCTIONAL CONFIGURATION

The functional configuration of the switch refers to the assignment of call-handling functions within the various gates of the system. This rubric covers the standard and optional operating features of the ACD and the manner in which the manager has them deployed. The functional configuration determines what types of calls will be handled as a separate class, the priority which is placed on calls of each type, and the agent teams which are assigned responsibilities within the gates handling those call types.

The functional separation of the incoming traffic into different types will be partly a function of the following: the corporate budgetary structure; the database requirements to handle each call type; the manager's analysis of the proper traffic mix; and the training needed for agents.

In one banking application there are seventy-five distinct call types that are handled within a single gate. This is because the corporate budgeting is done by a higher level division which only recognizes one class of calls financially--even though there are a multitude of types within this financial class. Consequently the agent training required is extensive and the agents' jobs difficult.

In another banking application, there is one ACD which handles credit card general service and another ACD a short distance away, but owned by the same corporation, handling credit card authorizations. In this case the switches are under-utilized because the budget enforces a complete split between financial classes.

These are the two extremes. The ACD manager must strive to hit the rational mean between the penurious and the extravagant.

The gates should be configured to account for economic differences in the volume of traffic. That is, the manager should take into account both the cost per call and the revenue per call for each avenue of incoming traffic. The cost of the trunks necessary to carry the traffic should also be considered. Many ACD systems split the WATS and local traffic into separate gates in order to save the lost WATS time spent queuing behind local traffic. In some cases the lost revenue can be substantial, in other cases minimal.

Citicorp studied their tripartite gate system and discovered that the separation of WATS and local was

saving only twenty-five dollars per month. For this it was hardly worth the effort to manipulate the reports for the separate gates.

For traffic types where there is a very high cost per call and a low revenue per call, as opposed to traffic types with a lower cost per call and a very high revenue per call, there should be a functional division reflected in the gate structure. Better service should be provided at the high dollar gate and lower quality service at the bargain basement gate. Another useful functional distinction is that between information gates and revenue gates. The airlines will maintain a few flight information gates and also a few ticket sales gates in order to separate the service functions from the revenue functions.

The database requirements limit the functional configuration of gates by virtue of the sophistication of the agents' training and the computer which supplies the call-handling information. In every ACD application, small, medium, and large, there is some requirement that the agent staff serve as a conduit for information between the customer and the corporate service.

Airline ACD agents are trading flight information for ticket reservations. In the credit card industry, the agents are trading authorization requests for the consumer's continued usage of the card. In the utilities industry, the agents are providing an information service in exchange for goodwill and the continued friendly regulation of the utility service. Each gate should be limited to a number of call types for which the agents can be readily trained. As the cost of training goes up, so do the costs of recruiting and the costs of turnover in the staff. The configuration of the gates can have a significant impact on all of these by providing for readily trainable agents divisions.

Balanced against these centrifugal forces which tend to produce a multitude of gates there are centripetal forces which act to consolidate disparate functions into single gates. There are some diseconomies in smaller gates, however.

Within limits, the call-handling efficiency of a larger group is greater than a smaller group. As the staff is divided into smaller and smaller gates, the efficiency, or total traffic capacity, of the system will decrease. The benefits of automatic call distribution and an even assignment of calls within the system can only occur on a gate basis. With the sepa-

ration of the center into more and more gates, the workload will become more and more uneven and thus more expensive. There are also costs associated with the additional supervision that may be necessary in the smaller groups which occur in a multi-gate system. The reporting activity needed to keep track of a multitude of gates will be more complex than that required for a single gate or a few gates within the system.

All of these factors must be balanced against the equally compelling reasons for dividing the call stream into distinct units. This is a judgement call. All of the agents within a particular gate and any agents assigned to interflow or overflow responsibilities should be trained to handle that type of function. In the credit card industry, managers typically set aside one group for credit card authorizations, one gate for general service on complaints and information, one gate for security, one gate for problem calls, and possibly a few miscellaneous gates for special purposes such as training or assistance.

The airlines set up their gate structure so that General Sales will have one gate, Tour Offices another gate, and high dollar account customers a gate of their own. Each gate typically has a separate phone number and each gate has an associated bundle of trunks that carry calls of only one type or of associated types. Some systems separate gates by the trunk bundles and devote gates to different types of regional service. However the gates are organized, there should always be an effort to maintain some kind of functional identity within the various trunk groups feeding that gate. This allows for economies in the database presented to the agents in that gate, as well as simplified training, monitoring, and supervision of the agents. If agents within one gate have a large number of extremely complex tasks, the management of that gate is going to be similarly complex.

The functional configuration of the ACD center needs to be studied in conjunction with the traffic volume of the switch. The traffic studies completed for Part IV provide the raw information necessary to understand the traffic characteristics of the ACD center. The traffic analysis will determine the trunking and staffing levels required at each gate. The long-term projections will allow the manager to intelligently plan for the expansion of the ACD center. Each gate will operate with a traffic stream of different patterns and distribution.

The manager needs to understand this traffic flow in order to adequately staff the center. The different

types of traffic all call for a slightly different staffing philosophy. Gates which have smooth traffic patterns can be staffed at constant levels. Gates experiencing rough traffic need a wider margin of safety in engineering the service levels and staffing requirements. The manager should use the ACD reports to acquire a thorough understanding of the traffic patterns at each gate and manage those gates accordingly.

The volume of traffic should be analyzed in terms of the number of calls offered at the gate, the number of calls handled at the gate, and the number of calls abandoned at the gate.

An offered call is defined as one placed by a caller who dialed the ACD, with every intent on receiving something for the trouble, and who actually received an answer from the ACD center--whether that answer was a delay recording, a busy signal, a queue with music, or the humane voice of an agent. It often happens that the caller will receive a busy tone and will blame the company being called for the poor service. The busy tone, however, may be from the central office. The caller either cannot seize a trunk which will carry the call, or the lines to the central office are overloaded and the caller will receive a reorder tone. For a call to count as offered, it must seize a trunk and actually reach the ACD--even though the caller may hang up immediately upon hearing the delay announcer. All the calls that actually take up, however momentarily, the call-handling capabilities of the ACD are counted as offered traffic.

There are differing philosphies of ACD management in the reporting organization of this type of offered traffic. Some callers will dial the wrong number, others will hang up the second they hear the delay announcers telling them to prepare for a long seige. Managers within the telephone operating companies feel that traffic which releases almost simultaneously with an answer cannot realistically be counted as offered traffic. Their feeling is that such short hits on the line do not qualify since the caller was hardly serious about getting through and no amount of careful engineering, and only very reckless overstaffing, would allow a center to handle such traffic.

Those ACD's which are revenue-producing centers rather than cost centers, typically have managers who feel quite the opposite about the problem. These centers make an effort to engineer their switches to include all the calls which are offered to the gate regardless of the length of time they are willing to

wait for an answer.

Both philosophies have merit and the manager must make an independent decision on this score. Typically the reporting structures of ACD's include the abandoned calls in their reporting of the traffic at the gate; the manager will usually not have much choice in the matter. Sometimes an effort is made to account for this quick release traffic through an analysis of the reports showing the average delay to abandon.

The number of calls handled is treated in a similar fashion in most ACD switches on the market. In an ACD the calls handled are considered to be only those calls which eventually reached an agent console and were then answered (the calls will include transfers and referrals throughout the system). These calls must reach the ACD agent consoles via a trunk or they will not be counted in the handled traffic. This means that internal calls between agents, assistance calls, and so forth will not appear in the handled traffic figures of the switch. Calls which are transferred from gate to gate in the ACD will be counted because they entered through a gate via the typical three- or four-digit (77xx) dialing sequence. Calls that are transferred between agents via direct dial to another position will not be counted in the handled traffic because they did not cross a gate in the process. The egress and regress through the boundary lines of the gates determines what counts as handled traffic.

Abandoned traffic is counted similarly in every switch. This consists of the calls that were abandoned before the caller was connected to an agent console. The incoming call must seize a trunk, enter the ACD through a gate, and either hang up before reaching the agent or hang up in the delay queue before being reached for an answer.

The desired service level should be considered for the system as a whole and for each particular gate. For revenue gates the procedure of marginal revenue analysis outlined earlier should be applied. In the non-revenue gates there is little need to assign trunks with a very small probability of blocking (less than .10). In most cases the blockage at a non-revenue, or particularly at a captive audience gate, should be well above this level.

There are many ACD's operating non-revenue gates with the objective of answering eighty percent of their calls in forty seconds or less. At this rate over twenty percent of the callers eventually abandon the queue.

The ACD manager should engineer the queuing structure of a non-revenue gate very carefully. A dollar amount should be chosen that the organization is willing to commit to non-revenue information functions and the gate built around spending that amount or a little less. The worst mistake in the configuration of non-revenue gates is to provide a high grade of service on the trunks and a low probability of answer within the queue. Under these conditions, the agent staff will be terribly overworked, the queue will be excessively long, and the abandonment rate will be such that the maximum delay period is experienced by the majority of callers.

Under non-revenue conditions it is wiser to configure the gate with a nearly one-to-one alignment of trunks and agents. In this manner the effective occupancy of the agents will not be artificially raised, and the cost of blocked traffic will be borne by the central office instead of the ACD. There is no point in providing queue service for calls that stand a high probability of never being answered. ACD managers may make the mistake of judging a configuration by the percentage all-trunks-busy figures without looking at the related staffing levels and cost functions. In a non-revenue gate this results in a considerable misallocation of capital.

There is also considerable room for educating the calling public. Telephone traffic is essentially random. Calling patterns, however, tend to group themselves around a known, or knowable, distribution curve. Business calls tend to reach their peak volume between 10:30-12:00 a.m. and 1:30-3:00 p.m. In a truly random environment, one must simply live with this distribution and plan for the busy hour.

In the non-revenue ACD with a captive audience (an audience who must use your service), there is little reason to accept random calling patterns. The distribution curve can be smoothed substantially by educating the callers. The ACD manager can encourage calls at off-peak hours through the circulation of a call distribution chart with the normal correspondence and billing statements. The public can be educated to make much more economical and efficient use of the facilities. This education effort has virtually no cost and may realize enormous trunk savings if it has even a small impact.

When examined closely, the generally held assumptions about the service level turn out to be surprisingly elusive and ill-defined. Of course, as manager, you wish to answer at least 80% of your calls in twenty seconds or less, but just what does this mean? The

yardstick against which the service level is being measured turns out to be a victim of relativity.

Consider the theoretical service level just mentioned: answering 80% of all offered traffic within twenty seconds or less. This service level implies that any call which is forced to wait in a delay queue longer than twenty seconds will count against the manager. For each call delayed longer than twenty seconds, the reported service level will be decreased, and the manager will fall further and further from the optimal goals set for the ACD.

This service level does not imply anything directly about the number of calls the ACD center failed to answer or the cost of failing to answer those calls. Nor does it say a thing about the quality of the telephone conversations themselves, nor dollar sales to callers, nor the efficiency of agents in other duties related to answering the call.

The reported service level will vary at different call volumes. If one call is delayed longer than twenty seconds among ten calls during a half-hour period, the reported service level will read 90%. This indicates that the manager was only ten percent below the performance parameter of 80% of all calls answered in twenty seconds or less. How good is this? There is no indication whether all ten of those calls were answered in less than two seconds or somewhere between eighteen seconds and the twenty-second limit. If one call is delayed longer than twenty seconds from amongst one hundred calls during a half-hour period, this will result in a reported service level of 99%.

The speed of answer on the incoming calls is the one factor on which management is most insistent. This is probably because it is, on the surface, one of the easiest to understand. There is something immediate and startling about answering 99% of the incoming calls within five seconds or less, but these numbers fail to relay the entire story.

Average speed of answer is an important statistic, but it must always be considered in the context within which the ACD is operating. Average speed of answer is defined as the time interval between recognition of the trunk seizure at the ACD and connection of the caller to the agent console. Since the time required for connection in a modern ACD is virtually nil, what the average speed of answer is really timing is that

interval the caller spends in queue listening to a delay recorder, music, or silence--growing ever more angry waiting for an agent to answer. Keep in mind that this is speaking about the "average" speed of answer. The chapter on teletraffic engineering provided some additional hints about what an average speed of answer of, say, five seconds means to the person who waits the longest in the accumulation of this average figure. While the average delay to answer may be five seconds, it is likely that someone else has been waiting much longer.

An ACD center should not be managed around some arbitrary average speed of answer. For a revenue-producing ACD, the average speed of answer will be a derived function of the revenue-maximization point. However many agents are required to reach that optimal revenue point will determine the average speed of answer which callers experience. If the corporation wishes to modify this number for non-economic reasons, this will have to be factored into the mix. In a non-revenue ACD, or non-revenue gate, a designated rather than derived average speed of answer is more reasonable. In this case the cost of each average speed of answer should be determined and a figure selected that management feels is a reasonable investment for continued good service and customer satisfaction.

PRINCIPAL MEASURES

The parameters of principal importance for the system manager fall into two related categories:

1. The service duration for each call.
2. The speed of answer on each call.

Within these broad categories the service duration is described by three factors:

A) The average handling time per call.
B) The average talking time per call.
C) The average work time associated with the call.

The speed of answer for each call also has three associated factors:

A) The average speed of answer.
B) The average delay in queue prior to answer.
C) The average number of calls "held" in the queue beyond a predetermined time limit.

The average handling time per call is defined as

the sum of the average talking time per call plus the average after-hang-up-work time per call. The average handling time is clocked from the moment the call is connected to the agent console (note that the time is not clocked from the moment of trunk seizure, but from the moment of agent connection in order to avoid confusing queue delays with handling time) until the agent completes any additional hang-up work by signalling to the ACD computer readiness to accept another call.

The after-hang-up-work time is all the time logged from the moment the call is completed (that is, the release button is pushed or the ACD system signals the console that the trunk has released) until the agent pushes the button to accept another call.

The average delay in queue, then, is really another way of stating the average speed of answer. The distinction between the two was mentioned earlier. The average speed of answer is the delay time on all calls, including those which were answered immediately. The delay in queue is the average waiting time before answer of the delayed calls--excluding the calls which were answered without any delay at all.

Once the service level is set for each gate, and for the system, this number can be used to generate all the other numbers in the system. The service level itself is read directly off either Erlang tables or the ACD reports corresponding with the number of agents required to reach the revenue-maximization point. There are some variables that are less variable than others: the average handling time is somewhat fixed, but susceptible to management; the number of calls offered is fixed, but again can be controlled--particularly by limiting trunk availability in a non-revenue gate.

The service level determines, from the number of calls offered, how many calls will be handled and how many calls will be abandoned. The service level sets the standards for the average handling time, the average talking time, and the average work time the manager expects to achieve. Of course, the service level directly states the average speed of answer, the average delay in the queue, and the number of calls that will be held for any given period of time. Staffing and trunking parameters are then derived from the service level. It should be emphasized that the service level is not some figure plucked from the traffic engineering handbooks. The service level is an objective statement of the center's maximum revenue production or cost minimization point. This point is

then translated into traffic engineering terminology and converted to the required average speed of answer, delay queue length, call-handling standards, etc., which allow constant assessment of the ACD's performance.

DEFINING TRUNKING PARAMETERS

Trunking is one area in which the knowledgeable system manager can save a great deal of money. Telephone bills for a small ACD center with eighty to one hundred agents can easily run thousands of dollars per month. An extraneous Band Five WATS line, at 450 dollars per month, can provide substantial savings if it is replaced with a cheaper line or taken out entirely.

There is no reason whatsoever to accept the judgement of the facility vendor about the operation and number of trunks that a system should install. The sophisticated ACD's, with their proliferation of trunk usage reports, have shown, over and over again, that ten to twenty percent of the leased circuits may not be operating at any one time. An even greater proportion may be working at less than optimal performance.

One major ACD vendor advised a mechanical ACD customer to configure the system with one hundred trunks and one hundred and twenty agents. With such a configuration, all incoming calls would be answered quickly, but in the meantime, the twenty extra agents would be twiddling their thumbs. Facility vendors are sophisticated in a number of areas, behind the times in others. The development of accurate trunking reports is one area in which some vendors still need improvement. There are prudent and reasonable levels of service that should be offered on the trunks, rather than simply striving for the best service possible. The engineering principles explained earlier, and more importantly, the trunking reports from the ACD, will provide enough information for the ACD manager to fine-tune the trunking requirements to any level of detail.

The competitive arena that telecommunications has become has brought with it many low cost alternatives to the public telephone service offerings. The manager should be aware of all the alternative services offered

by the specialized common carriers and private microwave dealers, and of the potential for installing private interoffice phone lines. In order to adequately understand and control trunking costs, the ACD manager must be familiar with the tariffs and aware of the competitive offerings.

The tariffs provide a wealth of information. They are enjoyable reading for slow afternoons because they raise hopes for trunking economies formerly unimagined. A basic perusal of the tariffs will help the ACD manager become familiar with these documents and their application. They are available for public inspection at the Library of the Federal Communications Commission, the state Public Service Commission, and the Telephone Companies. The FCC tariffs covering the list of rate centers and central offices should be examined. The tariffs on WATS service and the other types of leased line service such as FX and RCF should be studied.

The basic types of service from interexchange carriers which are important to an ACD center are as follows: DDD, WATS, FX, Private Line, and RCF. DDD, or Direct Distance Dialing, is familiar to everyone. The ACD center will rarely use this except on outcalls. Some very small centers may require customers to call DDD or allow collect calls to be accepted, but this is not an economical use of a sophisticated ACD. Typically the revenue per call and the call volumes will be large enough to justify some type of WATS calling service into the ACD with DDD used only for occasional outcalls.

WATS, or Wide Area Telecommunications service, provides a bulk rate for long distance calls. WATS service is established with different areas of service depending on the portion of the country the incoming telephone call center wishes to service. The charges for the different WATS areas are dependent on the area covered and the number of telephones each band will reach. Many ACD's use the broadest WATS area exclusively--which accepts calls from every state in the U.S., except the state in which the ACD is located. Sometimes a greater economy can be gained by seriously studying the WATS requirements and only buying the areas that match the incoming traffic for that portion of the country serviced by the ACD.

WATS OPTIMIZATION

The Interstate WATS tariff established by AT&T, along with the Foreign Exchange services, continue to

provide the majority of communication facilities used by incoming call centers. Some telemarketing centers that make outbound calls are experimenting with the plethora of interexchange carriers competing in the Out-WATS and DDD businesses; however, the AT&T tariffs still constitute the backbone services for most centers.

The AT&T WATS tariff is really a marvel of mathematical complexity. The software routines listed in Part VI allow a manager to model the WATS tariffs for any location around the country using any geographical coverage range and any amount of calling traffic. After a considerable period of time modeling various configurations and call volumes with this software, it becomes obvious that AT&T has designed a tariff which is very insensitive to volume shifts between the different coverage bands. It is very difficult to achieve any economies by splitting traffic among different bands. There are some applications which allow considerable savings even under the current WATS tariff.

The other key features of the WATS tariff are the sixty second minimum billing period per call and the provisions for group average billing and usage hours averaged over all lines in service.

The sixty second minimum billing period is currently under review by AT&T. The California tariff may become the model for the rest of the country with usage billing directly related to connect time and a transaction fee per call to insure a profit on very short calls. As it stands now, any call which reaches an ACD center, whether one second long or fifty-nine seconds long, may be billed as if it were connected for sixty seconds. The "may be" is a critical factor for the ACD manager to understand because there are ways to avoid being charged an excessive amount for very short calls. AT&T's billing system calculates the sixty second minimum charge by collecting all of the seconds of use during a month then dividing by the total number of calls counted during the month.

If the average number of seconds per call is less than sixty seconds, the total bill is calculated by taking the number of calls times sixty seconds and charging for that adjusted amount of time.

For example, if a center takes 100 calls in August that are fifteen seconds long, the total usage on the WATS lines is 1,500 seconds. However, the bill from AT&T will be for 100 calls times sixty seconds because the average connection time per call was only fifteen seconds instead of the tariffed minimum of sixty seconds.

There is a way around this dilemma by using the group average billing feature in the WATS tariff. The tariff allows a business to combine many different kinds of phone calls in a single center through group average billing. The only requirement is that each set of calls must have a common hunting point; that is, each type of call must be able to overflow into groups or lines carrying other types of calls. They do not have to actually overflow; they merely have to be able to overflow.

A common arrangement, then, is to install fifty or more WATS lines in a hunt group that will carry very short calls from data transmission equipment. The peak hour requirement for this traffic is calculated to be about forty lines rather than the fifty actually installed.

This group of lines taking very short calls is then allowed to hunt into a group of 200 to 600 WATS lines taking calls that average over sixty seconds apiece. These calls are group billed with the first set of lines but cannot overflow to the first group in the hunt; therefore, none of the callers will mistakenly receive a carrier tone from the data equipment.

The ten empty lines between the two groups insure that under normal circumstances there will be no overflow from the data equipment down into the agent groups. If an overflow does occur, there is really no significant adverse effect as the data transmission equipment will simply hang up and redial.

The effect of all of this is that the telephone company will add together all of the short call seconds and the long call seconds, divide by the number of calls, and come out with an average very near sixty seconds. The short calls will be answered essentially without any usage charges, and the long calls will not be billed for any time above sixty seconds. This technique can significantly reduce the impact of the new WATS tariff.

The other portion of this tariff that must be monitored closely is the effect of the "average hours of use" provision. Under the old WATS tariff, the amount of traffic on each line was measured individually. This allowed the hours of traffic on the first few lines to reach rate steps which were very inexpensive and brought the overall cost of the center into the twelve to fourteen cents a minute range. The current WATS tariff does not allow this. AT&T calculates the total number of traffic hours in a month on all lines and then divides that total by the average

number of lines which were in service during the month.

This means that a center which handled 8000 hours of traffic during September on 400 lines is only credited with 20 hours of average traffic per line. This 20 hours of traffic is in the lowest discount step of the tariff and is charged at the highest rates--even though the first line may have carried over 100 hours of traffic. There is really no effective way to beat this tariff feature; however, it should put the center manager in a very cautious frame of mind when considering the addition or deletion of trunks.

At the same time that AT&T instituted this feature of the tariff, they lowered the monthly charge for idle lines substantially. This led to a perception that unused WATS capacity was very cheap. This is absolutely untrue because each unused line reduces the average hours per line for the whole group and artificially raises the communications cost of the center.

All in all, this is a fascinating tariff with a number of quirks that must be understood thoroughly to gain the maximum benefit.

Communication managers should also be aware that there is a continual push to again revise the WATS tariffs both by AT&T and the business users. The biggest single impediment to AT&T marketing efforts at the moment is cost-based pricing. This legal requirement means that they cannot discount their services to large users without providing evidence that the differential is based on verifiable economic advantages to AT&T in providing that service.

Without the ability to discount to their large customers, AT&T will lose those large customers to private networks and the unregulated interexchange customers. Since a handful of very large customers provide a large portion of AT&T's total revenues, they cannot afford to lose this group. Telecommunication decisions of that magnitude tend to be five- to ten-year investments and AT&T does not want these accounts out of their influence for that long a period.

There is an overwhelming glut of transmission capacity which will peak in the late 1980's and early 1990's. An excessive amount of fiber optic capacity is being installed along railroads and pipelines throughout the country at the same time that high power multiple beam satellite systems are in development. In addition, the newer technology in digital signal pro-

cessing chips will obsolete the 64 KBit voice encoding standards now in use and make 16 KBit and lower voice transmission the new standard. These events all mean that a vast oversupply of capacity will have to find users.

The most likely users initially are the unregulated interexchange carriers that need a competitive advantage to gain market share against AT&T. As prices start to drop when all of these transmission advances converge, AT&T cannot afford to be left with a declining market base and an enormous installed transmission plant. AT&T, and everyone else, needs the large corporate accounts that will find ways to soak up this excess capacity--in much that same way as the exponential growth in data processing capacity has been overwhelmed by the invention of new requirements.

Currently transmission facilities cost about $7.00 per channel mile to install. As that cost approaches $1.00 or less, the entire concept of telecommunications will be radically restructured.

WATS provides a significant opportunity for AT&T to capture these large corporate accounts and still meet the requirement for cost-based discounts. A very large portion of WATS (estimates range up to 65%) is kicked back to the local intraexchange companies for access lines, billing services, and miscellaneous charges. If AT&T can establish a direct connection between their point-of-presence (normally a # 4ESS switching center) and the customer's office via T-Carrier, Fiber, or Microwave, then a decisive argument can be made to the regulators that a discount should be provided to the users with these facilities installed. Under these circumstances, large users could see 20% to 30% discounts in their WATS rates.

Another angle of this argument is that AT&T's network is becoming more automated and more sophisticated each year. As their digital backbone network is completed and the switching control software in the switches becomes more sophisticated, there is less and less reason for WATS to be an unintelligent transmission service. AT&T needs to retain a large WATS customer base in order to sell the value-added intelligent network services it will undoubtedly introduce over the next few years.

WATS is still the superior communication medium for ACD centers. This is because WATS has both broad geographic coverage and the ready acceptance of its service by consumers. The current tariff simply requires a more analytical approach to the use of WATS

in order to gain the maximum benefit.

Implications of the WATS tariffs for incoming telephone call centers include the following:

1. Users may find it less economical to swap lines in and out seasonally, since installation rates have risen to $186 a line (from $100) and the minimum monthly charge has dropped from approximately $240 to $32 per line.

2. Some users may find it more economical to acquire more in-WATS lines, since the minimum cost of lines has fallen.

3. Very few networks in existence in the 80's will prove economical for the changed pricing of the 90's. Many companies will radically change their networks, preferring to concentrate more on foreign exchange and other fixed facilities such as the high capacity T-Carrier services.

4. Optimal networking will become more and more difficult in coming years since the present WATS restructuring is only the beginning of at least three more years of fundamental changes in U.S. telephone calling prices. Traffic information generated by modern, electronic ACD's will be absolutely critical.

For incoming call centers, such as an ACD center, WATS service is invaluable because it allows customers to dial what is to them a "free" call. This greatly encourages customers to call and improves the revenue-production of the ACD.

FX LINES

Another type of service is FX, or Foreign Exchange lines. A foreign exchange line allows calls placed to or from a distant city to be made without any toll charges.. The FX service is billed on a mileage charge per circuit and can be extremely valuable as a replacement for circuits into very high traffic volume metropolitan areas. In most cases, a single FX circuit will cover a great percentage of a major city. When installing an FX circuit, the ACD manager should specify the central office at which the service is to terminate. Since charges are by mileage, the FX line should terminate in the central office closest to the ACD.

FX lines should be combined with Remote Call Forwarding (RCF) in order to gain the maximum economies. A random population of calling traffic into a

group of ten FX lines (assuming you are blocking less than 50% of your traffic) will result in a high number of hours on the first line, less traffic on the second line, and a relatively small number of hours of traffic on the last two or three lines.

This means that the last three FX lines, which you may be paying $800 a month for, are carrying very little traffic. Instead of filling a traffic requirement with FX circuits, the last few lines in a group should be RCF circuits that grab the overflow from the FX lines and transfer them into WATS lines based at the ACD center.

A simple analysis will show where the breakpoint is in any FX bundle. Assuming WATS for a large center is about $.25 per minute, anywhere the cost per minute of traffic on the FX is greater than $.25, the call should be remote call forwarded (RCF) to WATS. In the case of an $800 FX circuit, this means that any line which is taking fewer than 3,200 calls per month, or less than 53 hours of traffic per month, should be replaced with an RCF arrangement.

The other advantage of RCF is that FX lines are typically out of service 3 to 10% of any given month. The RCF lines provide a mechanism for bridging these service outages by providing your customers with an effective completion path even when the FX are down.

FX lines are slightly more expensive now than in the past, with every indication that FX lines under 150 miles long will see additional price increases in the near future. In addition, the process of divestiture necessitated the addition of "open-end minute" charges on FX lines. These open-end charges run from three cents to seven cents per minute of calling traffic dialed into the open end of the FX line and constitute a subsidy to the local operating company for switching calls into the FX circuit from their local territory.

There should be significant pressure to reduce FX costs as the supply of transmission facilities increases and as AT&T trims down their operation to reduce overhead expenses.

TIE LINES

Tie lines, or intermachine trunks (IMT's), are another type of service which is important to the ACD. A tie line connects two ACD's or two switchboards in distant cities by means of a direct connection which is free of toll or message unit charges. A tie line is

distinct from an FX line in that the FX line is terminated in a distant central office, while the tie line terminates on customer equipment.

The implementation of FX and tie lines should be decided on the basis of traffic volumes and economics in the same fashion as the WATS circuits. The ACD reports will provide a clear indication of the calling patterns and provide the manager's traffic engineering staff with the information necessary to find the economic breakpoints for each type of circuit.

There are several new multiplexing products on the market which make the implementation of four-wire voice circuits, like IMT's, even more economical. One product, the Com2 line multiplexor from Storage Technology Corporation, is being used by American Airlines and others with great success. American Airlines has been experimenting with the Com2 in their large tandem network. This product makes nine circuits out of five private lines and provides significant cost reductions for four-wire voice circuits and data circuits over certain distances.

T-CARRIER LINES

The newest tariff that should be of great interest to large center managers is the high capacity digital service using T-Carrier lines. This tariff is currently the lowest cost terrestrial service available into most major cities.

A T-Carrier line is simply a digital transmission facility with appropriate electronics to allow it to carry 1.544 million bits of information per second from Point A to Point B. This is equivalent to roughly 24 individual 3002 voice grade channels. A single T-Carrier circuit between New York and Los Angeles can carry the equivalent of 24 FX lines worth of traffic.

Since a T-Carrier line is a digital path, any type of traffic which can be digitized can be transmitted via these lines. Voice, data, fax, etc. can all be combined for transmission through these facilities.

It is also possible to use techniques such as adaptive differential pulse code modulation (ADPCM) to encode the voice conversations entering the T-Carrier circuit at 16 kilobits or 32 kilobits per second instead of the usual 64 kilobits. This allows a single circuit to carry 48 or 96 conversations simultaneously.

The user is allowed to select whatever type of

multiplexing equipment is desired to funnel traffic into the T-Carrier line. The ADPCM multiplexors, or the continuously variable slope delta (CVSD) modulation multiplexors can provide great advantages when setting up a combined voice/data network around an ACD center. Rather than running individual trunks or FX circuits to a given part of the country, it is now more economical to run a T-Carrier circuit into the economic center of your regional traffic, install a voice compression and data switching multiplexor, and then network intrastate WATS and FX, tielines, and data circuits off the end of the multiplexor.

This configuration not only lowers the cost of the transmission facilities into each region, it also allows the center manager to provide an FX network and cover a wider geographic spread for less cost rather than simply dropping twenty circuits into one area of a metropolitan district.

There are a great many manufacturers of this type of multiplexing equipment and some of the more sophisticated versions hitting the market will soon look like the current time division multiple access demand assignment techniques in which the 1.544 megabits of digital bandwidth is viewed as a resource pool; any activity which is requesting transmission capacity will draw from this pool as needed rather than assigning fixed amounts of capacity which may not be carrying traffic during any given second. These techniques will greatly reduce the cost of networking calls into an ACD.

TRANSMISSION ENHANCEMENTS

In addition to these offerings, there are a variety of new services available from the specialized common carriers. These services can provide significant savings over the circuit cost formerly experienced with Bell. Although these carriers are limited in their geography at the moment, the cost savings are significant for circuits between most major cities.

It is sometimes economical to install a private microwave system for short hops. The Los Angeles Times and IBM, for instance, are both using private microwave hops in the place of leased circuits and are saving substantial sums. This type of system is, perhaps, more practical for the sophisticated user.

As microwave systems become more reliable and less expensive, they will offer considerable savings to a complete spectrum of users. The payback period on line

of site microwave installations with hops under ten miles can be less than one year.

There are other changes in service offerings which will occur over the next few years and should have a significant impact on the communication costs for ACD centers.

The two major offerings currently in development are the Software Defined Network (SDN) and the Integrated Services Digital Network (ISDN). These two services really capsulize AT&T's basic transmission marketing plan for the next five years. This marketing plan appears to be divided into two parts:

1. Capture the major corporate accounts through significant discounts equal to the cost advantages of private networks.

2. Increase the revenue per call from smaller users to make up the discounts given to the large users.

An SDN system will allow a major account (for example, a customer with more than $25 million in annual billing) to bypass the local telephone company and connect each corporate location nationwide directly to AT&T's point-of-presence switch. All of the traffic from each corporate location will then be routed over AT&T's backbone network on-net to another corporate location or with tail-end hop-off at the distant end to non-corporate locations. The key to this arrangement is that all of the corporation's traffic will be collected, routed, and billed as if it occurred over a single dedicated network at substantial discounts.

The ISDN is a code-word for a much larger strategy that will involve reshaping AT&T's entire network to allow greater interconnection and switching of services while at the same time increasing the intelligence of the network. This change will alter AT&T's entire network to make it look much like the original concept for ACS (a.k.a. Net One, Net 1000, Enhanced Network Services) with the addition of voice switching services. This network evolution will also mean the demise of private line services in general with charges on a per message basis or per time basis just as is currently done in ordinary long distance.

Managers of small centers must be aware of these changes and prepare to make alliances with other carriers or larger users to insure an economical flow of calls.

Given this wide range of alternatives in circuit selection, the traffic volumes on each circuit, the different methods for measuring this volume, and the applicable service levels must still be understood.

TRUNK STATISTICS

The important trunk statistics cover a slightly different range than the staffing and call-handling statistics. The manager should be aware of the various ways these statistics can be calculated and also be aware of the implications of the various statistics.

The single most critical factor is the percentage of time that all trunks were busy carrying telephone traffic. This figure is included in the trunk reports of nearly all the ACD vendors.

The percentage that all trunks were busy is simply a comparison between the total amount of time that trunks were assigned and the total amount of time that every trunk in the system or trunk group was simultaneously being used to carry telephone traffic. For example, consider ten trunks in a group that were assigned for 1800 seconds apiece during a given half hour. For 1200 seconds of this half hour--scattered throughout the half hour--all ten of these trunks were simultaneously carrying conversations. This would mean that there were 10 x 1800 seconds of assigned time. To find the percentage that all trunks were busy, the 1200 seconds of simultaneous call-handling are divided by 18,000 to get a percentage all trunks busy figure of seven percent. This figure indicates that for seven percent of the time in that half hour, people who tried to call the ACD center would receive a busy tone for their efforts. They would not be able to reach a trunk to carry their call because all trunks would be occupied with traffic.

This calculation can also be done using the erlangs as a measure of offered traffic or CCS as a measure of offered traffic. The crucial thing is not so much this seven percent figure as calculating how many calls were blocked from trying to reach the ACD. In other words, how many calls would have reached your center if there were enough trunks for everyone all of the time? In relation to this, how many trunks would be needed so no calls were blocked and all calls could reach the ACD?

If a group of ten trunks is completely blocked seven percent of the reporting period, the Erlang B table indicates that the group was carrying a load of about 6.75 erlangs. Assuming that the average holding

time of a call was 180 seconds, this would mean that group was offered seventy-two calls, carried sixty-seven, and lost five calls in a half-hour period. From this information an economic analysis can be carried through on these five lost calls, and a determination made as to whether the cost of the additional lines to capture those calls is worth more than the revenue lost by allowing the calls to be blocked.

The seven percent service level is less important than the potential revenue that can be derived from any given grade of service. Looking at the Erlang B table, the addition of three trunks will drop the loss probability to around one percent. Is the price of three additional trunks worth capturing four more of those lost calls? That decision will have to be made by the manager once the relevant trunk costs have been calculated.

A few other measures of the trunking efficiency can be gathered from additional report fields that show the number of calls each trunk carried, the average length of time that trunks were seized for calls, the number of calls offered and abandoned on the trunks, and the average amount of time that a set of trunks within a group was carrying traffic.

The calls offered and abandoned are straightforward counts, similar to the counts for the agents at the gate. These calls were recognized, received answer supervision from the ACD, held for some period, and were either answered or abandoned.

The number of calls carried, then, is the offered calls minus the abandoned calls. These are all the calls recognized by the ACD as valid calls, seized and connected to the ACD queues, which remained waiting on the phone until answered by an agent.

The average trunk utilization time is another way of breaking down the statistics for total traffic-handling capacity of the ACD's trunking assignments.

The percentage of time that all trunks were busy gives a good indication as to when the blockage of traffic into the switch is exceeding the service level parameters deemed desirable by the ACD manager. The average trunk utilization time is particularly useful for showing the relationship between the amount of time that the trunk is carrying traffic, on the average, and the type of blockage that will appear given various levels of trunk usage.

Within the trunking statistics themselves, it is important for the ACD manager to have a logical arrangement of trunks into trunk groups for reporting purposes. The information groups in the ACD reports can be used to split each bundle of trunks into distinct groups comprised of trunks with some economic or functional similarity, such as WATS trunks, FX trunks, OPX trunks, or tie lines, to obtain the load that each set of trunks is carrying. This will facilitate the ongoing analysis for the best mix of trunks and blockage levels the manager will allow.

This blocking factor must be considered with the number of agents and the average handling time of the agents for each type of call. Predicting trunks for P(5) will be unrealistic if the swing in average handling times is not taken into account. Any delay on the agent side will increase the occupancy on the trunks. Since the trunks are working with a delay queue, their characteristics will model the Erlang B assumptions for the amount of traffic that can be carried, except that the Erlang C conditions of queuing will cause the trunks to block more traffic when staffing levels are low.

DEFINING INTRAFLOW PARAMETERS

There are several different types of intraflow available in the electronic ACD's. Intraflow allows the ACD to shift calls between gates if the call cannot be immediately answered at a primary assignment. This should not be confused with what is variously called overflow, interflow, load-balancing, or diversion. All of these terms refer to the distribution of calls between several different ACD's. Intraflow only applies to calls which are routed within the ACD itself.

There are two basic types of intraflow being offered. The Rockwell ACD provides immediate intraflow with intelligent queue routines. This means that a call entering the Rockwell ACD will be immediately assigned to a primary agent, a secondary agent, or a tertiary agent (in that order), and if none of these are available, the call will be placed in a delay queue to wait for an available agent.

The Teknekron, Rolm, AT&T, Northern Telcom, and Wescom ACD's all have queuing routines which determine the routing of a call once it is recognized by the ACD. These vendors provide a multi-part decision routine which allows a call to, for instance: First, look for a primary agent; Second, connect to a music

source; Third, look for a secondary agent; Fourth, connect to a delay announcement; Fifth, look for another gate, etc. A quite sophisticated call-handling sequence can be programmed by the user into these queuing routines.

Whatever method is used, the justification for intraflow call-handling is that the apparent size of the agent group connected to any given trunk group can be increased. The chapter on traffic engineering pointed out that large groups answer calls more efficiently than small groups. With intraflow, the incoming traffic can be spread out over a larger group. The actual implementation of the intraflow routines will be specific to individual ACD applications.

NETWORK CONFIGURATION PARAMETERS

The multi-node ACD's are fascinating and complex creations. These systems are among the most sophisticated communications networks in operation and make full use of combined PABX, ACD, and tandem operations with satellite, fiber optic, specialized common carrier, microwave, and private circuits carrying the traffic. These large ACD networks are certainly not easy to manage, but they also provide considerable economies of scale.

All of the major electronic ACD's can be used in some type of tandem routing scheme or load-balancing arrangement. There are a great many ACD sites which fail to take advantage of the devices' full power. The modern ACD's can be run like a WATSBOX^{R} or a least-cost routing system. Any system which will accept digits from a tie line can be used to route PABX or Centrex calls onto the public network or through a private network.

The ACD's routing packages can also be used to limit access to the network. The reports which the ACD generates on its own calls can be used to keep track of calls which are routed through it. There is an enormous range of possibilities for these machines. However, the typical application for multi-node ACD's is still load-balancing.

Although load-balancing does not exploit the full potential of the ACD, it is a function which is important and useful. In this function, several ACD's are tied together through dedicated four-wire voice circuits, intermachine trunks, or T-Carrier. When one ACD is closed or when the load on one becomes excessive,

the traffic is sent to the next switch.

This procedure is handled in a variety of ways, just as in the case of intraflow. Some ACD's use a delay dependent overflow from the first gate in the system. When the delay queue in the first gate (which must be a designated interflow gate) reaches a certain level, calls are sent to the next ACD. The receiving ACD does not engage in any intelligent signalling with the sending ACD in this case.

Other vendors, Rockwell International for example, use a signalling method that is very much like common channel interoffice signalling (CCIS). This type of signalling sends a query ahead of the call and asks the distant switch if it can accept any traffic. If this distant switch says yes, the call is sent--otherwise it is dropped into queue at the first ACD node. This kind of intelligent signalling makes more efficient use of the network. The ACD's with queuing routines use that programmed pattern to determine if calls should be sent to a distant ACD.

These systems can provide economies for ACD networks which cross time zones. Additional hours of service can be offered at some ACD's, or centers can be closed during light traffic hours while additional calls are handled more efficiently at a more active switch. The per minute cost of the IMT's (tie lines between ACD's) is extremely low, given the proper volume of traffic. The savings in staff costs can be very attractive. It is useful when involved with a network of this sort to have a night service feature or the ability to close a center by individual gates. This allows for a progressive closing of the system as traffic thins out for the whole center and obviates the requirement that everything be shut off at once.

These systems raise two very large problems.

1. There are seldom any organized ways to budget for the interflow of calls.

2. The total traffic load to be shared is difficult to predict.

The budgeting problem can be solved by the implementation of a network control center with the proper administrative personnel. A network control center collects all the traffic statistics for each node and insures that each center is credited with traffic handled for other nodes. The network control center also provides a central point for diagnostic efforts and routing management.

The traffic engineering problem is one that can be solved by simulation routines or practical experience. The mathematics required to actually solve equations for the traffic flow is unmanageable. A simulation technique will do a much more accurate job of predicting the cost savings and the traffic patterns in a multi-node ACD network.

To be effective, load-balancing systems should be implemented one step at a time and then allowed to run. Incremental implementation implies that the timing parameters used to send and receive calls should be progressively raised or lowered until the proper traffic flow is reached. Once a flow is established, the machine should be allowed to work uninterruptedly. The flow of traffic cannot be predicted on a minute-by-minute basis, and the load-balancing circuits must be turned on all the time to realize any economies from the system.

An additional tool which enables ACD centers to route calls is the Enhanced 800 service from AT&T. This service allows calls to be routed between centers based on the originating area code, the time of day, and the day of the week. Managers may even order a terminal for their center which allows changes to be ordered immediately with a service order. Enhanced 800 service provides a very useful facility for load-balancing and disaster recovery.

CHAPTER SIXTEEN

DEFINING STAFFING PARAMETERS

The critical issues in staffing stem from the service level and the differences between the expected agent productivity versus the actual work volume.

It is necessary to derive an assigned agents number that will, theoretically, handle the offered traffic and then predict the actual volume of offered traffic that the assigned agents will answer. This assigned agents number can be generated from historical data or from the Erlang C traffic formulas. Over a period of time, the manager may know that the agents can handle sixteen calls per half-hour or twenty calls per half-hour and will use this figure to forecast staffing.

If there are considerable variations in the traffic pattern which prevent this type of analysis, the Erlang C formula will provide a predicted value that will usually be high. The manager will have to experiment in each situation and find a correction factor for the Erlang C predictions. Either the tables or the formula can be used in this prediction.

If the manager expects ten erlangs of traffic during any given half-hour period and wants to insure that no more than twenty percent of the callers are delayed in the queue, then reading from the Erlang C table, fourteen agents should be assigned during the half-hour. Assuming an average handling time of 180 seconds, this would mean a delay on delayed calls of approximately 180/(14-10) or forty-five seconds. The average delay on all of the calls would then be .1741 X ((180)/(14-10)) or 7.8 seconds. These two measures indicate that, in common terms, eighty-three percent of the calls would be answered in eight seconds or less. This is an acceptale level of service for an ACD gate, but would have to be adjusted depending on the revenue-maximization point.

There is a great deal of slippage between the agents who are assigned at the management level and the calls that are handled at the operational level. These areas of slippage are the important statistics to consider when managing the ACD center.

One of the most basic types of slippage in the

agent staffing predictions is that not all the agents will appear on a given day. Due to any number of personal foibles and misfortunes, some predictable number of agents will not appear at their consoles at the assigned times. The ACD manager should chart the percentage of agents who appear against the number of agents assigned until a reasonable trend appears which will accurately predict the number of agents needed in practice. Of course, there are many things that management and personnel can do when operating together in this area.

All of these elements will be covered in more detail in the chapter on staffing, but it is prudent to remember that pay scales, turnover rates, sicknesses, working environment, management backbone, and the watchfulness of the supervisor crew are all critical determinants in maintaining adequate staffing levels.

Delving a little deeper into staffing considerations, it is necessary to consider the definition and content of some staffing measures. The positions assigned is a management decision. The actual positions manned depend on the agents themselves. The average positions manned is a more accurate count of the real staffing levels because it takes into account the amount of time that the agents are actually plugged into the console (or signed into the consoles in the case of the Agent Performance packages for Rockwell International, IBM-Rolm, Teknekron, and Northern Telecom).

Today's agent consoles have a sensor that will signal the computer when the agent has the headset plugged in. This allows the call processor to cease sending calls to a console with no agent present and also signals the Administrative Data System that it should count this time against the agent as unplugged time. The average positions manned figure is the total plugged-in time at the console divided by the number of seconds in the reporting period. For instance, if one agent is plugged in at the console for 1700 seconds during a half-hour period, this means that:

$$\frac{\text{1700 seconds of plugged-in time}}{\text{1800 seconds in reporting period}}$$

Equals .94 agents manned during that period.

Generally, the agents should be allowed some percentage of time away from the console that is equal to their total allocated break time, plus measured time required for research and reporting to supervisor, plus an increment of slack time (usually 1 to 5 percent) for

those odd moments when they're sharpening a pencil or getting a drink of water. This is an area management should pay attention to, but not get so stuffy as to annoy everyone.

There are some additional measures beyond the average positions manned that are essential. On some of the ACD systems, the average positions manned is broken down into the primary positions manned and the secondary positions manned. These measures are associated with the primary and secondary gate assignments that agents can be given within all of the digital ACD's on the market.

This works as explained in the following example. The airlines typically have one gate set aside for their very high-dollar acounts; for example, a large corporation with which they have a service agreement or a major travel agency. This high-dollar gate will typically offer only 30 or 40 percent of the total call volume to the ACD, but those calls account for 70 or 80 percent of the total dollar volume in business generated through the ACD. Obviously, the ACD manager is inclined to provide such customers the speediest assistance and most efficient handling. A typical solution in these cases, where manning may not be high enough to handle 100 percent of this business with little or no delay, is to assign auxiliary agents through the use of secondary assignments. This means that the agents sitting in the General Sales gate can all be given secondary assignments to the High-Dollar gate. If they are not handling primary calls, they will answer calls for their secondary assignment.

Conversely, if there is a gate with very little traffic, say the Admirals Club, then instead of assigning primary agents to that gate--where they will handle very few calls--all of these agents can be given primary assignments in the High-Dollar gate and also be given secondary assignments in the Admirals Club gate. When they are not handling calls at the High-Dollar gate (which will be purposely overstaffed), they will be available to handle calls for their secondary assignment. The ACD provides the breakdown of traffic to these primary and secondary assignments so the manager knows where the agents are spending their time.

These are the various elements involved with the actual staffing numbers. Within these statistics are some finer breakdowns as to the manner in which the agents spend their time. The three most important are the "occupancy," the "availability," and the "auxiliary work time."

The occupancy is measured a variety of ways within different reporting systems and it is best for the manager to become thoroughly familiar with the meaning of this field in the reports associated with each system. Occupancy is the comparison between the amount of time the agent was available to handle calls and the amount of time the agent was unavailable to handle calls. This percentage shows the time during which the agent was plugged in and taking calls at the console or in the after-call work state.

Availability is another statistic that is idiosyncratic to each system and should be analyzed as such. Generally, this field indicates the percentage of plugged-in time that the agent was available, ready, and able to handle additional calls. In this sense, it is a measure of the activity on the system. If availability is extremely high, it means that the agent was underutilized and the system is operating at less than peak capacity. The availability figure should be correlated with the designated service level for the system. Of course, as the chapter on economic analysis pointed out, there will be many situations where the point of maximum revenue for the ACD will be a point of minimum traffic-carrying efficiency for the ACD. In an ACD with a low ratio of labor costs to call revenues, it will be economical to staff at very high levels. This will mean that each agent is doing less, thereby lowering the traffic efficiency, but that the overall system is generating more revenue, thereby increasing the economic efficiency.

Auxiliary work time is a special key that keeps track of time spent on non-ACD functions. For instance, if the manager has agents doing invoicing or ticketing when they are not handling calls, they may press the auxiliary work key and continue with this activity while it is logged in a category distinct from the communications measurements found in the other ACD reporting fields.

The methods discussed above are the common and most important standards by which the performance of agents is measured. It cannot be overemphasized that the manager should be aware of what each standard means and what it is measuring. If an agent performance report is available, this will greatly simplify the measurement of individual agents.

These measures all quantify the physical presence of the agent as perceived by the customer. This information is usually gathered with measures associated with the gate level call-handling process. These measures are the average handling time, the

average talking time, the average after-call work time, and the average outcall time. While more meaningful at the gate level, these can be important factors for general staffing considerations.

Most ACD's are not managed in relation to these efficiency factors. It is generally felt that the call-handling process cannot be manipulated or streamlined. In the case of after-call work time, this is certainly not accurate. Much can be done to improve the data entry process for the agents and lessen the time expended. Reducing the average talking time is a more difficult problem. There is a tendency to say that a conversation cannot be rushed. The conversation should not be rushed, but it should be efficient. The average talking time should not be considered without reference to the average revenue per call (as a longer conversation may produce a larger sale), but the agents should be trained to accomplish the maximum good in the minimum time. The manager should not be in the position of accepting a given talking time because it always appears on the reports. This interval can be managed and thereby decreased or increased.

The most intellingent ACD users in the staffing area, when considering a non-revenue system, are the telephone companies. Every call is quick and efficient, producing the maximum flow of information in the shortest possible time. The telephone companies also do an excellent job of forecasting and staffing the ACD to produce the minimum cost within their stated service level objectives. There are additional measures of agent productivity which Bell developed for their Force Administrative Data System. These measures are useful in determining the effectiveness of the manager's own staff forecasts. There are three which should be useful in any ACD environment:

1. Schedule Efficiency Ratio
2. Team Efficiency Ratio
3. Efficiency Measurement Ratio

The Schedule Efficiency Ratio measures the accuracy of a revised staffing schedule. This ratio compares the predicted number of agents required to the average positions manned during the reporting period (Required Positions/Average Positions).

The Team Efficiency Ratio measures the accuracy of the forecast work time. This ratio compares the standard work time (which is the length of time a normal person would be expected to take on a given call) with the actual work time found in the reports (Standard Work Time/Actual Work Time).

The Efficiency Measurement Ratio looks at the accuracy of the predictions for the entire ACD. This ratio compares the standard positions (the number of people who normally would be required to handle a given workload) with the average positions staffed (Standard Positions/Average Positions).

When considering the problem of staffing, the ACD manager should also be aware of the audio response units and voice recognition units which are entering the market. These machines are already installed in a number of ACD's and provide a rudimentary answering function that can serve as a replacement for human labor in specific applications. Once more sophisticated voice recognition units are produced, it may be possible to replace a great percentage of the agent staff. Dialog, Periphonics, Votran, and other vendors are producing units which either perform a function in response to the entry of keyed touch-tone digits or actually recognize and respond to a human voice.

There is every indication of a significant breakthrough in audio response and voice recognition equipment during the 1980's. AT&T, IBM, and other smaller companies are spending sizable R&D sums to be the first to produce a voice-activated typewriter. These machines will be able to accept continuous dictation from any speaker and translate that speech into typed output or command responses with a 97% or better accuracy rate.

Audio response equipment is achieving widespread acceptance by the calling public. Many airlines and credit card companies are using this equipment to accept requests from merchants and consumers.

The economics of these systems are not difficult to appreciate. A typical audio response system requires a capital expenditure of $4,000 to $6,000 per line. That line will be able to take traffic 24 hours a day, 7 days a week. Human operators may cost $5.00 per hour. After fifty days the audio response system has recovered the capital expense. Voice recognition systems will be much more expensive and still achieve significant savings over the $31,200 it would cost to staff one line with one person over a three-year period.

PART V

MANAGING THE EFFICIENT ACD

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CHAPTER SEVENTEEN

PHYSICAL LAYOUT

The configuration and design of the physical plant for an ACD communications center has an enormous impact on the efficiency of the center and the work habits of the operating staff. Much of what should be done in this area is a matter of common sense. The difficulty is that not many corporations have the flexibility or the economic resources available to rebuild their communications operation around the requirements of an ACD.

For a small center, and this might involve only five to ten agents, little needs to be done beyond providing adequate working space in an office. The primary consideration is to maintain some proximity between the agents and the operating equipment in order to stay within vendor specifications. This type of preliminary site layout will usually be covered by the vendor or a subcontracted architect who understands the vendor's equipment.

For the larger sites, ranging from fifty to six hundred agents, there should be considerable attention to detail in the layout of the communications center. A thorough site survey is necessary to insure that the following requirements for a computer environments are within the specifications: adequate air conditioning, floor loading requirements, additional power supplies, underfloor cabling, etc. Again, the vendor and the contractor will usually insure that these arrangements are acceptable. Many companies buying an ACD of this size will already have data processing facilities and understand the need for special care around this type of equipment.

Another area which requires some foresight and careful planning on the part of the communications manager is the layout of agent equipment stations. There are some beautiful communications centers with pleasant working conditions and efficient system designs. United Airlines and PSA Airlines are justifiably proud of their reservations centers. These offices are models of quiet productivity and operational efficiency. There are other centers in which the ACD consoles and information books were dropped

onto the old desks from the secretarial pool, and the communications center was instantly in business--after a fashion.

An ACD center can be a very noisy and hectic business area. With two hundred people conducting simultaneous conversations in one room, the situation becomes nerve-wracking. There is no good reason to maintain an ACD center in a large area with no partitions and row upon row of desks where everyone talks just a little louder to overcome the voice of the next person who is also talking just a little louder.

The communications center can be organized along the lines diagrammed in Figures V-1 and V-2. Each pinwheel or cubicle area should have one team of agents. Each area is then assigned one supervisor, with the system supervisor in a convenient location near the center or periphery of the office. Carpeting on the floors and sound insulation tiles in the ceilings are a must. The walls between agents' stations should be low enough so that a supervisor can see over them when standing, but high enough that seated agents cannot see into other areas. A convenient lounge and rest area should be located adjacent to the main area.

Each agent station should be equipped with the telephone console, an information set (whether this be printed forms or a CRT data screen), and any other essentials. There should be a dual jack on every agent station allowing supervisors to plug into conversations while they are walking through the team's area.

If the center is constructed with large windows, there should be some shading, either from a sun-screen in the glass or by an overhang. The newer consoles are constructed with LED displays and illumination lamps. These bulbs are easily washed out by reflected glare or direct sunlight.

The center should also be constructed around a reasonable estimate of the company's growth patterns. Either construct the center with floor space for the maximum capacity of the current ACD equipment or for the projected agent requirements over the life of the office area. The additional space can be used for other purposes until the center's growth reclaims the area.

The room should be organized with consideration given to transitions between the night service agents and the other shifts. This can be accomplished either by staggering the arrival and departure times of various teams or by assigning an adjacent set of consoles and cubicles to the incoming shifts.

A TYPICAL AGENT NUMBERING SEQUENCE FOR 4 GATES

Lead Supervisor

Gate One

Group Supervisor

1029	1030	1031	1032
1025	1026	1027	1028
1021	1022	1023	1024
1017	1018	1019	1020
1013	1014	1015	1016
1009	1010	1011	1012
1005	1006	1007	1008
1001	1002	1003	1004

Gate Two

Group Supervisor

1124	1123	1122	1121
1117	1118	1119	1120
1116	1115	1114	1113
1109	1110	1111	1112
1108	1107	1106	1105
1101	1102	1103	1104

Gate Three

Group Supervisor

1224	1223	1222	1221
1217	1218	1219	1220
1216	1215	1214	1213
1209	1210	1211	1212
1208	1207	1206	1205
1201	1202	1203	1204

Gate Four

Group Supervisor

1320	1319
1317	1318
1316	1315
1313	1314
1312	1311
1309	1310
1308	1307
1305	1306
1304	1303
1301	1302

COMMUNICATIONS CENTER

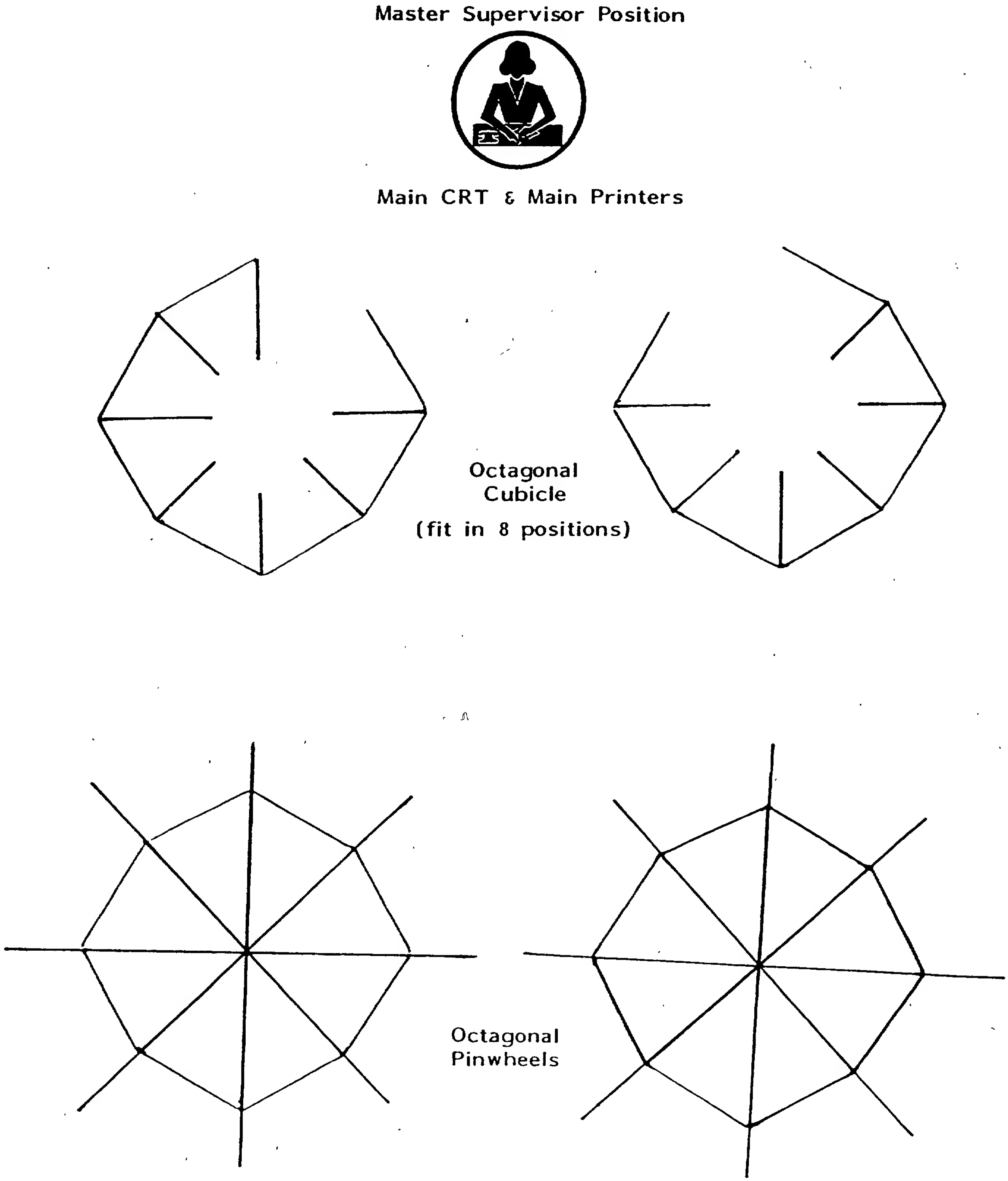

Figure V-2

CHAPTER EIGHTEEN

STAFF ORGANIZATION

The communications staff may range from a one-person organization with shared responsibilities in other departments to a full-sized communications department with independent management, analysts, and an autonomous budget.

The key to a successful communications management team is power. The management organization must maintain an independent budget and be fully aware of its responsibilities. There must be some effort to allocate costs based on each department's use of the communications service. A large organization will require a central planning group to make decisions for the entire communications area. Typically this will mean a merger between the data processing communications staff and the voice communications staff. This joint communications department should then report directly to the top management of the profit center --not to an intermediary with no knowledge or concern for the communications job.

In this larger entity of the communications/EDP department will be a management staff responsible for the operation of the ACD. Since the modern ACD's are typically a combination ACD, PABX, and tandem switch, this management staff, in the larger departments, will usually have a great deal of influence on the overall communications decisions. In a system with multi-node ACD's tied together by a private tandem network, or utilizing load-balancing tie lines for economy of scale throughout the ACD network, the profit center ACD communications staff will also work with the corporate communications staff on decisions involving the network as a whole.

A familiar arrangement within the airline industry is to assign operation of the ACD to the reservations management staff, then divide the authority for the actual ACD equipment between this department and a facilities group. The problem with this arrangement is the absence of a centralized budgeting and planning function for the whole network and lack of direct responsibility for the overall operation and management of the ACD.

Sometimes users have poorly organized communications departments. Occasionally, the person who orders the ACD will not talk to the person who installs the ACD and that person will not talk to the people who actually run the ACD. Centralized authority is the only method that will sustain effective day-to-day operation, as well as the long-range planning needed to maintain the ACD's efficient service level.

An ACD center requires specialized personnel. If the department is large enough, an effective ACD staff will consist of:

1. General Manager
2. Communications Manager
3. Staffing Group
4. Trunking Group
5. System Supervisor
6. Team Supervisors
7. Equipment and Maintenance Group
8. Support Group of Analysts
9. Training Staff
10. Quality Assurance Group

If the ACD is part of a network, additonal personnel will be required to control the network and maintain circuit quality on the lines.

The general manager is responsible for everything that happens, and doesn't happen, in the ACD center. This person reports to the communications department or directly to the profit center director. The general manager relies on staff assistants to prepare the final budgets and make recommendations on equipment purchases and general system goals. This individual could also work with the corporate communications staff responsible for network concerns.

The communications manager is directly responsible for day-to-day operation and maintenance of the ACD center. In smaller systems the communications manager's tasks are combined with the system supervisor's responsibilities. The operating personnel in the ACD organization report directly to the communications manager. At this level, the communications manager typically interacts with the system supervisors, the group supervisors, the staffing and trunking groups, the training group, and the people responsible for the equipment room.

The staffing group is often, in smaller systems, a shared function. For larger ACD's the staffing group is responsible for hiring, firing, assignment, and scheduling of the agent staff. The training group and

the quality assurance group, as well as the system supervisor and the group supervisors, work with the staffing group. The staffing group, along with the communications manager, prepares the reports required for upper management and determines the staffing levels necessary to meet the service objectives. This group should be competent analysts themselves, or have priority access to analysts, in order to make staffing decisions. In a smaller system, the work done by this group can be divided among the communications manager, the system supervisor, and the group supervisors.

The trunking group performs tasks similar to those of the staffing group. However, members of this group work more directly with the analysts and equipment personnel than the supervisors--although they should obtain line trouble reports from the group or system supervisors. There should be discussion between the trunking and staffing analysts, as the level of staffing within a particular gate serving any given trunk group will significantly affect the level of blocking against that trunk group. In a smaller system this function can be assumed by the communications manager. The trunking group also consults with the corporate communications staff about load-balancing trunks and network tandem trunks.

The system supervisor is usually in charge of the direct, real-time operation of the ACD. The system supervisor may share these responsibilities with the communications manager. The system supervisor usually sits in a master control room, or at least has access to the system configuration control CRT, and monitors the overall call-handling capacity of the ACD. This person should have authority to move, add, or drop agents and trunks within the ACD, as well as all other configuration commands (with the exception of inter-nodal network commands), in order to effectively balance the staffing of the ACD against the traffic demands of the various gates. The system supervisor is directly responsible for maintaining the established service levels throughout the daily operation of the ACD.

Team supervisors are directly responsible for their group of ten to forty agents. The team supervisors monitor the activity of these agents and handle assistance calls or trouble calls that are beyond the capability or training of their group members. Team supervisors assume responsibility for the quality of the telephone service within their team. These supervisors are also responsible for performance evaluations and must have the power to make recommendations on firing and promotion.

The team supervisors will not usually handle calls themselves; they provide an assistance function and can be given report analysis duties or staffing functions in a smaller center. The quality assurance program will often be assigned to the team supervisors in a small ACD. If the center is small enough, the system supervisor might serve as a replacement for the team supervisors, but generally this results in too much to do with too little control.

An equipment maintenance group is optional. Most vendors provide either a site engineer for the customer or a service center within a reasonable distance. However, many ACD centers handle their own equipment maintenance and rely on the vendor for software maintenance only. Any company with a data processing shop will usually have personnel qualified to maintain the electronic switches now on the market. ACD centers with personnel who perform their own maintenance seem to understand their equipment better at all levels and show greater imagination in the application of the switch. The cost savings of self-maintenance can be substantial. This is an option worth considering.

There is a need for highly skilled professionals among the staff of analysts. The quantitative and analytical skills required to make effective financial decisions are quite advanced. The analysts group operates as a central pool of information available for the use of anyone in the communications department. This system works much like the Library of Congress does in relation to the Congress. The analysts are part of an independent service which provides a library of information and technical skills that are loaned to other departments. In this capacity the analysts are responsible for providing the information other groups need to make decisions. Within the analysts staff there would be people specializing in financial analysis, tariff information, trunking, and forecasting. This group could keep up to date in technological advances and provide a central file of software changes and system features of the present ACD.

The training group is usually a staff of only one or two people, even for the largest organizations. However, the importance of these individuals cannot be overemphasized. The ACD world is just like that of the PABX--there is a mind-boggling array of special features and capabilities that no one uses because no one can remember them. The training department is primarily responsible for training new agents, but it should also work with the system and group supervisors in an auxiliary training program on a continuing basis.

The quality assurance group is a separate function only in regulated environments. ACD centers required to report their service levels to a Public Utility Commission usually must maintain a quality assurance group which monitors the agent staff on a regualr basis. In other ACD centers this function is taken over by the system supervisor or the group supervisor.

The ACD manager must consider staffing from a number of different perspectives. In the workplace, fear is often the simplest motivator. However, generous encouragement coupled with opportunities for career advancement are better motivators for the highly skilled and intelligent workers generally found in the ACD environment.

There are two personnel philosophies in operation among communications managers. One presumes that agents are merely intelligent typewriters connected to an audio response mechanism. The other believes agents to be reasoning individuals with a sincere interest in their performance. The two groups hire differently, pay differently, and expect different things. Both managerial types get people to work for them, lots of people, and they can run effective centers. The second group, however, also employs people who enjoy working for them. It's a question of economics or aesthetics: whether one is more effective than the other. With regard to ACD agents, that study has yet to be done.

There is a tendency to view agents as a herd of interchangeable parts. When that tendency becomes overt, the manager finds a union steward sitting next to the system supervisor. An ACD should be run at peak efficiency, but the long-range goals of an efficient manager must also include the well-being of the agent force.

There are several important criteria in hiring, whatever your management philosophy. Some of these criteria will be determined by the location and configuration of the ACD. Hopefully, the site location was chosen not only for convenience, but because the surrounding locale can supply a large pool of educated workers. Most of the tasks performed in an ACD environment require people who can think on their feet, deal with irate customers, understand a complex database, and promote a product or service.

There are ACD applications, such as credit card authorization and record sales, which can operate at minimal labor standards. The complex tasks, however, will require very bright high school graduates or college graduates. If the ACD can be located in a

university town, so much the better. This is not to suggest that students are the best workers, but faculty wives and faculty husbands are often very good choices. There will also be a number of people with irregular schedules available for swing shifts and night duty.

A critical consideration in hiring is the union. If there is a union, it is best to be thoroughly familiar with its rules and regulations. The use of part-time help, temporary shifts, and emergency agents can be severely restricted if the union rules are misconstrued.

The costs of hiring and turnover are enormous, and anything which may lessen these costs should be examined. A careful record of employee profiles matched against the people who stay with the company and those who leave may uncover some clues to assist in the hiring process. Some people, for example, work at an agent console for three months and run screaming from the room; others settle in for a lifetime.

Many ACD centers, particularly in the airlines industry, require a grasp of detail which is beyond the average individual. Thorough screening can save the countless dollars lost when employees and job requirements are mismatched.

Firing procedures also are determined by job specifics. When a union is involved, employee dismissal must be conducted according to stringent regulations. In a non-union ACD center, there should be definite performance standards maintained. Any agent who cannot meet those performance standards after a reasonable training period, and retraining period, should be dismissed--provided there are replacements available. Many ACD centers establish minimum criteria by which to judge an agent's performance. If a certain work volume or sales volume is not maintained, these criteria should be used as the basis for dismissal.

All jobs don't require creative people, but your personnel department could be encouraged to be more innovative. Most personnel need not be hired according to outdated standards. An eager and interested pose during an interview doesn't always guarantee a dependable worker. Employ the reserved, but qualified applicant, add in a few misanthropes--you may be pleasantly surprised by the evolution of an efficient and conscientious work force.

CHAPTER NINETEEN

TRAINING

No one teaches as well as a teacher. There are definite tricks to the trade, as well as good and bad ways to present information. A teacher has to be accurate and informative, yet entertaining and stimulating. These skills are developed and enhanced by the experience of being a teacher. The moral here is that a former teacher can be a valuable addition to any training program.

Fortunately for the ACD manager, there are always good teachers who would like to get out of high school or college teaching. Because they are good teachers may be precisely why they would like to get out. When considering such an individual, see a sample of their work. Teachers, like entertainers, are usually comfortable with the requirement that they audition for a job. Any good school will require prospective teachers to present a class before a hiring decision is made. The personnel department and the ACD manager can establish the same requirement.

Once a good candidate is chosen, it is mandatory to send them through the vendor's training course. Every large communications company will offer a full range of standard and optional courses covering their equipment. The courses will teach participants the software, hardware, and operational features of the ACD. Members of the training department should take such courses every time a new software release is purchased, or whenever changes are made in the operational characteristics of the switch. Operating the ACD consoles and equipment is only one aspect of the training program, but it should be understood as completely as other elements.

The training program for phone representatives should be established in accordance with the complexity of the agent tasks. Some training courses can be completed within a week; one major airline developed a three-month training program for its agents which requires a college degree for entry.

The training course should be a three-stage program covering all aspects of the agent's job at increasing

levels of difficulty. Three stages are established to allow a progressive weeding out of unacceptable candidates. There is little point in allowing twenty-five poeple to sit through a five-week training program --only to flunk half of them at the end.

The first stage is a one-day session on the basic job description, center operation, and ACD performance goals. The trainees tour the center and are given a general orientation lecture about their job. At the end of this day, a test is administered covering the basic skills required of an effective agent. This provides an opportunity to fail those who passed the personnel screening without the requisite basic skills.

In the second stage, the trainees are taught the actual procedures required for their jobs. They become familiar with the communications equipment they are to use and the database CRT or information files. Drills are conducted which include pushing the buttons required to complete calls on mock consoles and working with the database files. The trainees are given time to observe and monitor seasoned agents performing the same tasks. A performance evaluation file is maintained on each agent and regular tests given to eliminate the ill-adapted.

The training department usually writes a programmed text which the trainees use as a guide and reference source in their jobs. The programmed text should spell out the job description and the objectives toward which trainees should strive. Competition and pressure are tremendous teaching aids--they should be applied in liberal doses in the classroom, along with generous encouragement and practical application.

Since the students will be actively performing a task once their training is complete, the second stage focuses on this task, and classroom exercises simulate that task as much as possible. Verbal presentation of physical procedures has almost no impact until trainees are allowed to perform the action themselves. Most of the larger ACD's offer a training position that simulates the functions of an agent or a supervisor. Students should spend time in this controlled environment until they are comfortable with the tasks required in the ACD center.

This second stage involves only those remaining trainees who have demonstrated their competency and will take a job within the center. This training can take place in the classroom or the ACD center. At this stage, the trainees should be competent enough to answer the telephone and assist with calls. It is

important to put trainees in a separate gate or statistical reporting group in order to evaluate them in relation to the established agent force.

The third stage provides advanced training and continued drills in the operation of the equipment, as well as additional instruction in techniques of salesmanship and effective service. Some ACD centers, such as credit card authorization services, will not need agents with sales training. For an ACD center selling a product or service, such training is essential. Many key phrases sound merely pleasant or neutral, yet may trigger a positive sales response.

In addition to the initial agent training, the training department should work with the supervisors to offer additional training to agents who are lagging behind accepted work standards. This should be done as unobtrusively as possible. If an agent is singled out for remedial training, it may be less embarrassing to leave the company than sit through the class. Some centers offer refresher courses on a regular basis and send all of their agents. This brings everyone up to date on company procedure and equipment changes. This is also a good time to reiterate the importance of consistency in the answering and call completion routine. Training programs can be extremely efficient tools throughout an agent's job cycle--not just in the first few weeks.

CHAPTER TWENTY

SUPERVISOR GROUPS AND AGENT TEAMS

The basic management unit in an ACD center is the agent team. An agent team consists of ten to forty agents, one to four lead agents, and a team supervisor.

The team supervisor is in charge of the day-to-day performance and real-time supervision of the ten to forty agents reporting to that supervisor. The number of agents in a team is determined by equipment and management limitations. For an ACD with relatively complex tasks, the ideal size is fifteen agents per supervisor. A system with few agent assistance calls and an uncomplicated task may have forty to sixty agents in a team. The maximum number of agents in a team is limited only by the number of positions which can be displayed on the team supervisor's CRT screen or lamp display. The supervisor can only manage as many as can be monitored. While systems vary, the CRT's in most ACD's will not allow the real-time display of activity states for more than fifty agents at one time. Since the supervisor performs quality assurance work, agent evaluation, and monitoring, in addition to the assistance function, there should be enough activity to keep teams of fifteen to twenty agents busy.

The team concept is used to maximize the performance of the ACD. The desire to perform well before one's peers is part of human nature--as is the tendency to get lost in the crowd. An ACD center organized so that the agents sit in a large, homogeneous mass may produce agents who suffer from alienation. Alienation in this case is the divorce of oneself from responsibility and a lack of identification with the task or role being performed. In a large group of agents, the feeling may arise that "someone else in the group will do it" and the individuals tend to coast. In a smaller team, there is a sense that "we" are doing it, and the wonders of peer pressure will soon be evident.

A great deal can be done to promote this team concept and its motivational effects. Physical layout of the agent consoles and work areas should reinforce the sense of a group working together. All the people within a team should work for the same gate, report to

the same supervisor, and be studied within the same statistical reporting group. Perhaps the most radical application of the team concept is to report on each individual team, as compared to other teams within the ACD. This will occur by itelf, but it is also possible to spot the performance levels of each team and encourage the resulting competition. One communications manager in the industry has obtained some interesting results through a more subtle approach. While casually strolling through the center, this manager "accidentally" drops the appropriate agent performance reports near the appropriate agent stations, confident of the ensuing scramble and increased efficiencies.

Within the team itself, an even more radical idea is to encourage the self-regulation of the unit. There are several ACD centers which have gone so far as to provide a pay differential between teams based on performance. The performance data on each individual within the team is also made available and the group is rated according to the average of all the individual performances.

The reporting systems of the Rockwell International Galaxy ACD, the Teknekron INFOSWITCH[R], and some others, allow the collection of statistics on individual agents, based on an identification number that agents key into their console. Under these conditions, the team members will exert considerable pressure to insure that all members of the team are working at capacity. Any members of the team who are bringing down the average for the group as a whole will be encouraged, not so subtly, to return for training, increase their performance level, or to leave.

The team concept is useful in all types of ACD centers. However, it should be recognized that it is most useful in a cost center rather than a revenue center. In a revenue center, there is an inclination to allow agents the maximum time on a call they feel is required. Their special training in sales techniques makes them competent to make this decision and generate additional revenue. In this situation, the competitive team concept would be counterproductive unless the evaluation was tied to revenue-generation rather than call-handling efficiency.

In a cost center, where each call and each additional second on a call is costing the company money, the competitive team concept is most advantageous because it drives handling times down and maintains maximum occupancy of the console.

When the teams are larger than twenty agents, it is

useful to appoint lead agents within the group who can provide secondary assistance and leadership functions as backup to the team supervisor. In cases where the team supervisor is off-duty or ill, the team leader would be capable of handling this position. Not only does the lead agent concept allow the manager to second -source the team supervisor, it also allows the other agents to recognize the opportunity for advancement. It is all too easy to forget the considerable management potential among the agent force, but the agents will not forget if they're forgotten.

There are good and bad assignments within the ACD, as well as prestigious and unattractive gates within the system. The manager should be aware of these distinctions and assign the better teams to the better areas. If the ACD is using union agents, union rules will govern the assignments. Union rules usually require that agents be allowed to bid for assignments based on their seniority.

In all of the sophisticated ACD's (Rockwell International Galaxy, Teknekron INFOSWITCH®, AT&T ACD, Northern Telcom SL-1, Rolm CBX-ACD, Wescom 580 ACD), the manager has the capability to set multiple gate assignments for the agent staff. This allows the manager to more effectively distribute the traffic load and provide for large group efficiency within a structure of clearly identified smaller groups.

Each agent is given a gate assignment which indicates the type of incoming traffic that agent will answer. The agents may be responsible for a given set of trunks, or a particular region, or a certain type of call. The initial gate assignment, the agent's "primary" assignment, is usually in the gate which handles the majority of the traffic that agent will be trained to answer. For instance, a bilingual agent might have a primary gate assignment in the International Travel group of an airline ACD. Since the agent's bilingual skills may not be needed all of the time, a "secondary" assignment to another gate may also be established. This secondary assignment would require the agent to assist with traffic from the general sales gate. If all of the agents who normally (and primarily) handle general sales calls were unavailable, then the call would be routed to the secondary agent in the International gate. The same procedure can be followed with tertiary assignments. This allows agents to back each other up from gate to gate and to handle overload or delay queues from other gates.

When establishing any type of crossover arrangement

between gates, it should be remembered that the proper database information and the proper training must be implemented. To be effective this procedure also requires some consideration of the economies made possible by the backup functions.

If a high-revenue gate with a small calling volume is used to back up a low-revenue gate with a high calling volume, there is some danger that the agents in the high-revenue gate will become overloaded with calls from the other gate and not be able to fulfill their more lucrative functions with the proper level of service. The assignments should be balanced by predicting the theoretical overload under different traffic conditions and then staffing in accordance with those predictions. It is usually preferable to fully staff the high-dollar gates with primary agents only and back up these agents with people from other gates. Agents from those gates with equal revenue per call can be used in a one-to-one backup arrangement.

Every ACD needs a monitoring and quality control function to insure that the objective service level identified in the reports is also a humane and conscientious service level during the actual telephone conversation. A great deal of the manager's job involves translating that telephone conversation into a series of numbers, charts, and budgets. But it is the human content of that conversation which helps bring customers back and enhances the public perception of an organization's quality.

In a large installation the quality control group is a separate team which continually monitors agent performance and sometimes the circuit quality. The quality control group makes recommendations on retraining, assistance, or adjustments in the call-handling procedure. The smaller ACD's will assign this function to the group supervisors, or it may be handled informally within a group of five to twenty agents.

There are legal difficulties associated with monitoring. The ACD manager should be aware of the local regulations in regard to this practice. In most cases, monitoring is allowed if it is done for training purposes only. Some areas do not allow monitoring in any form if the agent's identity or the identity of the calling customer is recorded.

Whoever does the monitoring, it should be done objectively and on a regular basis. One person, performing only the monitor function, can analyze the performance of each agent in a group of two hundred about once every two weeks. This assumes an average of

fifteen to twenty minutes listening to each agent, which would involve about four calls, and some time per week for reports and recommendations to the supervisors or the training department. Again, the analysis function should be as objective as possible. It is very easy to listen selectively and only hear what is expected.

A useful procedure is to combine the results of the monitor analysis with the ACD's printed reports for that time period. If the ACD has an agent performance reporting package, those reports should be examined for the monitor period. If the system does not provide this, the agent should be moved into a separate reporting group and statistics gathered during the monitor period. Each call should be ranked via a printed form that checks the main areas of the agents' responsiblities and training. In some centers this will be a very simple checklist, in others which expect their agents to also perform a sales function, this will be correspondingly complex. A sample form is printed below for a moderately complex monitoring function.

Reports of this type should be collected on each agent and used in the evaluation and review cycle. They should also be included in the agent's personal file. The ideal situation is to tie this quality control function into a CRT database that will allow the automatic production of an agent work profile and eliminate the extensive paperwork that the monitor function usually generates.

MONITOR DATE______________

FEDERAL SERVICE MONITOR REPORT

Agent Phone #	Trunk ID	Gate	Team

Supervisor's Name______________________________

Agent's Name______________________________

	A	B	C	D	F	NA
QUALITY OF GREETING	___	___	___	___	___	___
AUTHORITY	___	___	___	___	___	___
KNOWLEDGE	___	___	___	___	___	___
HELPFULNESS	___	___	___	___	___	___
PROMPT ASSISTANCE REQUEST	___	___	___	___	___	___
SALES TRAITS	___	___	___	___	___	___
OFFERED ADDITIONAL SERVICES	___	___	___	___	___	___
SUGGESTED RENTAL CAR	___	___	___	___	___	___
SUGGESTED ACCOMODATIONS	___	___	___	___	___	___
ASKED FOR SERVICE AGAIN	___	___	___	___	___	___

REPORTING SYSTEM ANALYSIS

Average Handling Time____________________________
Average Talking Time____________________________
Average Work Time____________________________
Efficiency Ratio____________________________
Occupancy_______ Availability_______ Average Call Rate_______
Attach Supporting Data

FEDERAL SERVICE ACD MONITOR REPORT

Recommendations:

____ Additional Training — Team

Rank______ ______

____ Supervisor Conference

____ Commendation — System

Rank______ ______

____ Review

____ Personnel Action

Additional Comments:

PART VI

ADMINISTRATIVE DATA SYSTEMS

CHAPTER TWENTY-ONE

KEY REPORTING REQUIREMENTS

One of the principal reasons for installing a modern, computer-controlled ACD is the availability of a comprehensive administrative data reporting system. The reporting system illuminates a formerly obscure area and provides the manager with an X-ray of the call-handling process essential for effective management. The modern ACD's are no longer dependent on central office peg counts or scanning devices. The manager has a complete accounting of every activity in the ACD from the handling times of individual agents to the real-time status of individual trunks. There are cost accounting packages, forecasting packages, and trunking packages all designed to provide an ACD which handles more calls, with fewer agents, at a higher service level, and under complete management control.

Given the constraints imposed by the system size, its complexity, and the management philosophy, each communications department must choose a reporting package which fulfills the needs of the specific ACD application. Most of the ACD's on the market offer a wide range of standard and optional reporting packages which provide almost every conceivable level of detail and complexity. Many users also build their own software packages to provide different reports to supplement the vendor's data collection.

Each manager must determine what elements are critical to the effective management of the ACD and which can be foregone. However, there are some core reporting requirements that appear in the repertoire of each vendor, and these are required for any relatively complex ACD applications.

Every reporting system must examine:

1. Gate Statistics
2. Information Group Statistics
3. Trunk Capacities
4. Delayed Call Statistics

Within each of these categories, the various manufacturers provide different definitions and methods of displaying the data, but there are some similarities worth examining.

Gate reports could just as easily be called "system reports." A gate is an area dedicated to handling calls of similar functional identity and is the designated zone within the ACD where a certain group or bundle of trunks channel their calls into the assigned agents. Statistics gathered at the gate show the effective service level, as perceived by the customer, after the incoming calls have been answered by the ACD. It is within the gate that the average speed of answer and the efficiency of the agents are captured. The gate reports provide a summary of the efficiency of the ACD system as a whole.

Other reports look at additional elements of this summary. The trunk reports will capture the information between seizure of the trunk, answer of the trunk, distribution of the call to an agent, and the final release of the trunk by the central office. The agent reports examine the same time segment collected by the gate reports, except that for the individual agent group, the only meaningful statistics are the handling efficiency of the agent group itself. Average speed of answer is not considered for the agent group alone because this number is only important at the gate level where the calls are actually pulled from a delay queue and assigned to the agents. The duration of the call-handling times, the number of calls handled, and the efficiency of the call-handling process are the important measures within each agent report.

The gate reports generally contain five major areas of statistical information:

1. Incoming Traffic Flow
2. Average Staffing
3. Call-Handling Efficiency Measurements
4. Load-Balancing Statistics
5. Outgoing Traffic Flow

This information may or may not be included in one report. Each vendor cuts the information a slightly different way.

The incoming traffic flow will be reported as offered, handled, and abandoned traffic. These categories are defined in Part III in more detail. In some cases, these categories will be split between the system reports and the trunk reports. Often the system report will only show the handled traffic, with the

offered and abandoned traffic appearing in the trunk reports or the agent reports. Wherever they appear, this information is essential to track the volume of offered, versus answered, traffic through the ACD.

The average staffing figures will, at a minimum, show how many agents were actually handling traffic during any given time interval. These figures should appear as an average manning figure to account for the percentage of time agents were assigned to answer calls but were not plugged in to accept calls. In a more complete reporting package, the standard reports will include a breakdown of agents manned at primary and secondary assignments, as well as the percent of occupancy and availability for agents within those assignments. Some vendors, notably Teknekron, IBM-Rolm, and Rockwell International, offer a reporting package which collects a set of statistics for each agent under a unique agent identification number.

The call-handling efficiency reports typically include summaries of the average handling time, the average talking time, and the average time after the call is hung up that agents spend doing paperwork related to the call. These efficiency statistics will also show the average speed of answer on the calls, the average delay time in queue, and the overall service level for each gate in the system.

The report fields concerned with load-balancing will show the volume of traffic which was offered at one gate, then shifted to another gate for answer because of a lack of primary agents in the first gate or because the delay queue at the original gate had exceeded customer-specified timing parameters. Typically these report fields will show the amount of traffic each gate answered for other gates.

The fields for outgoing traffic are similar in all of the reports. There are usually two fields, and they show the number of outgoing calls and the average length of time spent on those outcalls.

These categories are collected at the gate or system level. The statistical summaries contained in these reports will be displayed in two or three forms on most ACD's. There will be "real-time" reports, appearing at the system supervisor's and the group supervisor's CRT screens, and there will be a set of printed reports that appear on half-hourly, hourly, and daily intervals. Some ACD's also allow the supervisors to request each of these reports on a demand basis and send them to a CRT or a line printer.

The division between gate statistics and information group statistics is one of the more important distinctions in the way reporting statistics are collected at the ACD. The gate is a static entity containing all of the trunks which directly feed that gate and all of the agents assigned to handle calls within the gate. As such, the reports generated at the gate will be a large mass of collected and averaged statistics. This is necessary because an ACD should offer a comparable service level to all of the incoming callers within the homogeneous functional grouping of the gate (with the exception of priority queuing on special trunks). That is, the agents have to be considered as one group in order to measure activity within the whole gate.

Within each gate there are usually sub-groups for which the manager requires reports. These sub-groups may be the supervisor teams, separate training groups, or any other subset within the larger gate unit. The use of information or reporting groups for management reporting purposes allows a sub-group of reports to be generated which can be compared to each other and the performance of the total gate. These two types of reports are collected independently of each other. An agent, for instance, might be assigned to Gate One for general sales calls and be measured as part of the system report on the general sales gate. However, that agent may also be a college graduate trained via a new method. So the agent is placed in Reporting Group Fifteen, which contains a number of agents from Gates One, Three, Five and Seventeen who were all trained under this new program.

Additional cross-references can be obtained by setting up several reporting groups within Gate One that gather statistics for different team configurations or administrative duties within the larger functional grouping (keeping in mind that an agent can only be assigned to one information group at any one time). The reporting groups will usually contain the same types of information as the gate reports, but will be lacking the range of detail. These reports may not include the call-handling efficiency statistics, such as average speed of answer and service level.

The trunk reports provide some of the same information found in the system reports and the information group reports. The traffic flow (in offered, handled, and abandoned calls) will be shown along with the call-handling efficiency (through figures on the average holding time), and the trunk efficiency. The trunk efficiency is reported for a

group of trunks and will include measures of the amount or percentage of time all trunks were busy and the percentage of time the trunks were carrying traffic. In addition, the number of outgoing calls and the average time spent on those calls will be included. The trunk reports will also show a peg count for each trunk group and a list of the trunk types installed at that ACD.

The delayed call reports are another important tool for successfully managing an ACD center. These reports will show how long it took to answer incoming calls and how long the callers would wait in queue until abandoning the effort. Most of these reports will also show the average time spent in queue and the average length of the queue. These are invaluable aids for determining the delay tolerance of the customers and the effectiveness of the defined service level. The combination of gate reports, showing the offered load, and delayed call reports, showing the abandoned traffic rate, fills in the gap produced by using the Erlang C traffic formula. Erlang C does not take accurate account of the abandoned call rate. With the use of these reports, the manager can directly compute the abandoned rate and factor that into staffing decisions.

With the basic set of reports listed above, a manager can effectively staff and control the ACD operation. In order to fine-tune the ACD and derive the maximum performance and economy from the switch, it is necessary to delve a bit deeper and consider some of the special reports.

CHAPTER TWENTY-TWO

ANALYZING THE REPORTS

The high speed, bi-directional, dot matrix printer has been churning out reports for the last three months faster than the office clerk can thread them into plastic binders. The CRT screens are constantly flooded with a vast and confusing array of numbers, symbols, warnings, and codes. The new ACD is in place and doing its electronic best to bury the manager and his staff in an information overload.

A large ACD with a comprehensive Administrative Data System can churn out well over a hundred pages of reports each day, every day of the week. No one can read and analyze all of this material. Most of the information will serve as backup reports should research be needed on a particular area. The manager has to establish key fields that will be examined and specific parameters that signal a need for action.

Since the real-time, or CRT displays, are the mainstay of the minute-by-minute management of the ACD operation, these will be discussed before the printed reports.

The system supervisor's CRT screen is the central control point for the overall operation of the ACD. It is from this screen that the general flow of traffic between the trunks and gates is observed and controlled. The system supervisor is only occasionally concerned with the actual status and operation of a particular team of agents or any individual agent. These activities will be monitored only to determine if there are any bottlenecks in the system as a whole. The system supervisor should have the forecasting charts for each gate in the control area. The required staffing requested by the system supervisor and the team supervisors, as determined by staffing meetings based on projected call volumes, should be listed on this chart along with a head count on the number of employees who are at their stations. If there are significant variations between the required staffing levels and the actual staff on hand, then the master supervisor should make adjustments between the gates and call in the "on-call" employees.

There are some key items the system supervisor should watch for on the reports. The incoming traffic volumes should be compared to the forecasted volumes to determine new trends which will call for more or fewer agents on the floor. A seasoned supervisor can very quickly determine if any given day is going to exceed or fall below the projections by observing the traffic flow early in the day. The service level indicators should track the goals set for the system. At the same time the call-handling efficiency of the agents should be watched to predict whether the expected traffic volume per agent is going to be attainable.

Another useful measure of the system's efficiency are the fields for the queuing statistics. The system supervisor should know, roughly, what types of delay parameters will produce what level of service and what level of lost calls. The necessary adjustments can be made by moving agents among the gates to compensate for high or low traffic. If an overload condition occurs, the supervisor can then remove trunks from service and allow the queue to regain a normal flow. It is very difficult for the traffic flow to recover from an overload condition unless the manager takes positive action. The mathematics of a queuing system point out the futility of hoping an overload will stabilize itself.

The response to these types of problems vary depending on the type of ACD installed. The basic key to catching and solving problems before the congestion or lost revenue reaches a critical point is to continually monitor the actual traffic against a standard that the manager and staff have predicted for that day.

Follow a typical system supervisor, using an imaginary ACD with features from several vendors, through one trouble period and notice the use of various reports to identify, diagnose, and remedy traffic problems. Figure VI-1 is a portion of the printed report which shows data for all the gates. This is a comprehensive view of the call-handling process at the gate level.

SYSTEM REPORT

12 APR 85 12:30

GATE	SERV. LEVEL	OFFER. CALLS	HNDLD CALLS	ABAND. CALLS	ANSWR. SPEED	POSITNS. MANNED
ONE	75	234	227	7	13	31
TWO	94	167	165	2	7	36
THREE	33	3	3	0	43	4
FOUR	0	2	0	2	0	.6
FIVE	3	29	23	6	680	2

Figure VI-1

The system supervisor or manager checks this report against the projected volumes and staffing requirements and notices some immediate problems. Gate Five is falling way behind and Gate Four isn't handling calls at all. Gates One and Two are working about where they're supposed to be and Gate Three is coasting below its efficient levels.

The delayed call report is examined to look for the trouble. This report is shown in Figure VI-2.

DELAYED CALL REPORT

GATE	MAX DLY	0	5	10	15	20	30	40	50	60	180	+UP
ONE	# HANDLED	1	130	17	13	12	12	5	18	9	0	0
TWO	# HANDLED	0	97	32	15	11	1	2	2	5	0	0
THR	# HANDLED	0	0	0	1	0	0	0	0	1	0	0
FOUR	# HANDLED	0	0	0	0	0	0	0	0	0	0	0
FIVE	# HANDLED	0	6	1	0	0	0	1	0	1	0	22

Figure VI-2

Since Gate Five is in the worst trouble, that area is examined first. The Delayed Report displays the classic symptoms of an overload condition. Instead of a normal distribution of calls, with the greatest number grouped around the ideal handling time predicted in the staffing meetings, there is a sprinkling of answered calls throughout the range and a cluster at the end of the chart. This gate is in a crisis situation from which it will not recover on its own. A quick calculation shows that the gate is experiencing 2.48 erlangs of traffic with two agents assigned. Erlang C predicts a probability of delay greater than

100 percent under these conditions. The traffic tables indicate that at least four agents are needed to bring this gate into a stable condition. Since the agents in Gate Three are coasting, those four agents are given secondary assignments in Gate Five to relieve the overload. Another quick calculation (# of Agents X Reporting Interval) - (Handled Calls X Handling Time) shows that these agents have been idle only 58 seconds total during this half-hour period. This is a 98.4 percent occupancy. The supervisor makes a note to congratulate the agents on their efforts and extend some sympathy.

Next the agents in Gate Four are examined. It is not at all clear what has happened here judging from the two reports. It is clear that these agents are either refusing to answer calls or are doing some other work. The supervisor turns to another report to identify the problem. This report gathers the intraflow statistics and checks the work these agents are doing for other gates on a secondary assignment basis. The report is displayed in Figure VI-3.

INTRAFLOW STATUS REPORT

GATE	SECONDARY STAFFED	SECONDARY PERCENTAGE	SECONDARY HANDLED	OVERFLOW HANDLED
ONE	39.7	28	180	0
TWO	6.1	14	26	166
THR	0	0	0	36
FOUR	0	0	0	4
FIVE	0	0	0	0

Figure VI-3

Now it is clear that the agents in Gate Four have been handling calls for some other gate instead of their own. The Overflow Handled column documents the number of calls that agents with a primary assignment in this gate handled for some other gate. Both of the calls offered to Gate Four were lost because the agents were handling calls for Gate One (as shown in the staffing map). A look at the agent group report for those people also shows that their handling time on the secondary assignment was in the neighborhood of 477 seconds. This report is shown in Figure VI-4.

AGENT GROUP SUMMARY

Group 04

POSITIONS STAFFED	HANDLED CALLS	HANDLING TIME	TALKING TIME	WORKING TIME
4	4*	477	145	332

Figure VI-4

This report explains the problem. The handling times for the *calls (which indicates overflow traffic in this ACD) are clearly above the acceptable range. The talking time is fine, but the working time is 332 seconds. A similar report for Gate One shows a working time of 59 seconds.

The excessive work time is probably the result of agents handling calls for an unfamiliar gate. Either a supervisor made the wrong secondary assignments or these agents need additional training in their secondary duties. Because they are spending this much time doing the paperwork for a secondary assignment, their own primary assignment is not being handled.

To complete the analysis for this interval, the trunks should be examined. The trunk report is shown in Figure VI-5. The complete report is reproduced because this ACD has the trunk report built around groups which do not correspond to the agent groups. If at all possible, the trunk and agent groups should be aligned, unless there is a compelling reason to split them up. In this case the manager wanted to look at regional trunk groups regardless of gates.

The trunks with zero offered calls and some number of seconds in the Holding Time and Use Time field are being occupied by outcalls. These are being used very little and are probably uneconomical unless they are DDD circuits. The manager should consider using two-way trunks in these cases. This report shows a system with too little blockage on the trunks throughout the groups. There are very few of these trunk groups experiencing any lost calls at all. This might not be a bad situation. It is possible that this is a slack day and that the excessive trunking is exactly right during the busy day or the busy hour. It does need to be investigated further. In several of the gates there is inadequate staffing to handle the load that these trunks can carry. It might be necessary to reformulate the entire system configuration.

TRUNK TRAFFIC REPORT

GROUP	OFFRD CALLS	HNDLD CALLS	ABAN. CALLS	HELD CALLS	HOLDG TIME	USE TIME	ALL BUSY PERCNT.
1	23	20	3	1	197	302	0
2	0	0	0	0	144	408	0
3	10	8	2	1	64	366	0
4	9	9	0	0	111	127	0
5	0	0	0	0	120	120	0
6	0	0	0	0	100	435	0
7	0	0	0	0	137	91	0
9	0	0	0	0	281	1054	9
10	0	0	0	0	107	161	0
12	84	83	1	21	225	1720	66
13	7	7	0	1	226	792	28
14	14	14	0	3	319	1115	21
15	14	14	0	2	117	547	8
16	15	15	0	4	164	491	0
*	*	*	*	*	*	*	*
47	8	8	0	1	137	1099	61
TOTAL							
441	427	14	77	202	572	***	

*This indicates missing groups removed for illustration purposes.

Figure VI-5

With a complete set of reports, the manager can work through and chart all of the critical call-handling problems in the ACD and begin to suggest economical solutions.

CHAPTER TWENTY-THREE

LONG-TERM REPORTS

Long-term reports are an important tool for finding and responding to major trends which alter the traffic patterns at the ACD. In most cases there is no need to examine the half-hourly reports in any detail. A useful feature of the ACD is the ability to turn off the automatic printed reports which appear every half hour and store these extra reports on tape or disk. Generally only the daily summary reports will be important enough to save and discuss at reqular meetings among the communications staff.

The agent and the trunk reports are often the most important because these areas determine the system's revenue production. It is sufficient to store the half-hourly reports on tape and either use them as they appear and throw them away, or disable the printing of the reports. The daily printouts should be collected into computer paper binders, labeled, and filed for the two-week to one-month period that they may be useful for analysis and forecasting. The reports saved in this fashion can be useful training tools for the system supervisor and the team supervisors when analyzing the daily operation of the ACD.

Once the basic trends have been extracted, there is little use for the printed reports, unless the ACD does not have the capability of storing the records on disk or tape. The tape reports should be labeled in a consistent manner. Usually the tape label will be some form of the date on which the tape was closed. In multi-node ACD's with network analysis services, it is vital that the tapes use a common labeling scheme. All the tapes from September 5th, for example, can be analyzed without laboriously cross-checking the coded labels.

The long-term reports should be used to graph the long-term traffic patterns and staffing capabilities. Any broad trends will appear during this analysis and the manager can shift the staffing requirements or begin thinking about the need for expansion in the ACD equipment itself.

The historical reports can also be used to detect

any shift in calling patterns. It may be that various regions are calling less than before, that people are calling earlier or later in the day, that the volume of business is shifting from one gate to another. These trends can be passed along to the marketing department or the sales department to determine if additional emphasis is needed in some area or if there is a new market available.

An airline might identify a slow shift away from the general sales gates and into the tour gates. This may indicate that a new advertising campaign, designed to channel customers through local tour offices, is working. There may be a decline in calls from one region of the country. This could indicate that the marketing thrust for that area has become ineffective. A thorough examination of the internal reports may reveal the relevancy of a surprising number of external factors.

The long-term reports are also useful in justifying additional staffing to upper management. These reports will identify peak seasons during which the service level deteriorated. If the ACD is operating within a regulated environment, this historical data can be invaluable for determining why the service level changed during a certain period, or for justifying modification in the type or level of service.

Whether the ACD's reporting structure allows tape records or only printed records, the manager should make some effort to examine the larger trends in the ACD. This information should be summarized and made available to other segments of the corporation.

CHAPTER TWENTY-FOUR

MANAGEMENT REPORTING

The subject of management reporting covers those things which upper level management should and should not know about the operation of the ACD. The primary vehicles for this information flow are the monthly or semi-monthly operating statistics that are passed from the communications management team to the corporate management team.

Typically the ACD management staff will not be autonomous. There will be some requirement for a regular review cycle of the ACD's operation and a statement of current and future budgetary needs. The ACD manager can influence, to some degree, the magnitude and form of the reporting process and should make every effort to insure there is an effective and reasonable reporting requirement. Management reporting functions are all too often an exercise in excessive pencil pushing. Any manager can dream up outrageous reporting requirements. The trick is to produce a set of reports that are informative without requiring an inordinate amount of paperwork.

In general, the reports to upper level management are limited in scope and are confined to averages for peak hours and days. The reports to the external groups should be confined to those necessary to justify the budget and provide management with a sketch of the operating capability of the ACD. The management reports should relate the ACD's defined service level to the operation of the switch in the areas of offered call volume, handled call volume, staffing levels for each gate in terms of average call volumes per agent, trunk service levels as a percentage all trunks busy, cost per call for agents and trunks in each gate, and any plans for additional switch expansion or cost-saving measures.

The reports for management should match the system reports and require as little hand manipulation as possible. Many times the only difference between the reports that are printed at the ACD and the reports which are delivered to upper management are the heading labels.

The only areas which should require some hand calculation are the revenue per gate figures and the comparisons between previous months. It is much more economical to teach management how to read the new reports than constantly translate the ACD reports into the format required by the management guidelines.

In the case where multiple ACD's are interconnected with load-balancing tie lines, or where the ACD is operating as part of a tandem network, the reports to upper management will necessarily be more extensive.

The internal reports should be comprehensive, detailed, accurate, and concise. It is easy to proliferate a blizzard of paper unless the purpose of each report is carefully defined. These reports should contain enough information to clearly display whether or not the ACD center is meeting the stated performance parameters.

CHAPTER TWENTY-FIVE

FORECASTING

Historical data is not always adequate for managing an ACD because the required agent curves are not linear functions of the traffic intensity. There are efficiencies to be gained in large groups. Large groups can simply handle more traffic than small groups. There are possibilities for variations based on the primary, secondary, and tertiary assignment. Interflow between multi-node ACD centers adds another variable to the already confusing mix. A group of agents which consistently handles fifteen calls per half hour under one set of conditions may handle ten more calls per half hour under a different set of conditions. The only way to allow for this type of variation is through forecasting.

Basically, the manager needs to forecast the trunking requirements, the staffing requirements, expansion needs, and the cost tradeoffs among several alternatives.

Forecasting for an ACD is somewhat of a primitive art. Most of the traffic formulas discussed in Part III were designed and tested with PABX traffic or tandem switching applications in mind. The forecasting programs listed below are only a rough tool which individual managers should modify and adjust to match their ACD conditions. The programs are written in BASIC and are designed for a Tandy Model II microcomputer. These programs are available on diskettes for IBM and Radio Shack microcomputers through The Telecom Library.

The first listing calculates values based on the Erlang B formula. This simple routine will print a delay probability value for a given amount of traffic and the requested number of trunks.

The second listing calculates values based on the Erlang C formula. This routine predicts the probability of delay given a certain number of calls trying to reach a specified number of agents.

The third listing is a slightly more complicated version of the Erlang B formula that provides more information about the traffic carried on each line.

The fourth listing calculates AT&T's WATS charges. It can be used to determine the optimum location for a new center, the impact of adding or deleting lines, and virtually any theoretical issue regarding the WATS tariff. The WATS modeling program must access files which contain information about all of the rate steps in the AT&T tariff and the cost of each WATS zone. This information can be obtained from your AT&T representative or ordered through The Telecom Library. The last few listings are examples of file construction routines that can be used to fill the tariff files if you choose construct your own database of WATS information.

The logic of this program must be understood thoroughly before using it or significant miscalculations may result. Once the program is mastered, it can eliminate endless hours of manual analysis required to do WATS optimization.

```
10      CLS
20      'ERLANG B DELAY PROBABILITY ROUTINE
30      INPUT "MAXIMUM CALLS OFFERED PER HALF HOUR";A
40      INPUT "AVERAGE HOLDING TIME PER CALL";A1
50      INPUT "MAXIMUM NUMBER OF TRUNKS";K
60      A=(A*A1)/1800
70      T=0:P=1:P1=1
80      DIM X(K)
90      T=T+1:P=P*A/T:P1=P1+P:P3=P/P1
100     IF P1>1.0E+15 THEN P1=P1/1.0E+15:P=P/1.0E+15
110     I=I+1:X(I)=P3:IF I=K THEN 130
120     GOTO 90
130     INPUT "ENTER # OF TRUNKS FOR DELAY PROBABILITY";K2
140     IF K2=0 THEN END
150     PRINT X(K2):GOTO 130
```

```
5       CLS
10      'ERLANG C DELAY PROBABILITY ROUTINE
20      INPUT "MAXIMUM CALLS OFFERED PER HALF HOUR";A2
30      INPUT "AVERAGE HANDLING TIME PER CALL";A3
40      INPUT "MAXIMUM NUMBER OF AGENTS";AG
50      A2=(A2*A3)/1800
60      T=1:P=1:P1=1:DIM Y(AG)
70      IF T <= A2 THEN 110
80      P2=P*(A2/T)*(T/T-A2):P3=P2/(P1+P2)
90      I=I+1:Y(I)=P3
100     IF I=AG THEN 120
110     P=P*(A2/T):P1=P1+P:T=T+1
112     GOTO 70
120     INPUT "ENTER THE NUMBER OF AGENTS FOR C VALUE";AG
130     IF AG=0 THEN END
140     PRINT Y(AG)
150     GOTO 120
```

```
10      'FILE NAME:                 ERLANGB
20      CLS
30      PRINT CHR$(02)              'TURN OFF THE CURSOR
40      '*****************************************************************
50      PRINT @20,"ERLANG B GRADE OF SERVICE CALCULATION "
60      '*****************************************************************
70      '                    INPUT SECTION
80      '*****************************************************************
90      PRINT @170," ENTER THE NUMBER OF CALLS EXPECTED IN A MONTH ";
100     INPUT MCLLS
110     PRINT @250," ENTER THE AVERAGE LENGTH OF THE CALLS IN SECONDS ";
120     INPUT CLNGTH
130     PRINT @330," ENTER THE PERCENTAGE OF CALLS EXPECTED IN THE PEAK HOUR ";
140     INPUT PEAK
150     PRINT @410," ENTER THE NUMBER OF WORKING DAYS IN THE MONTH ";
160     INPUT MDAYS
170     PRINT @490," ENTER THE GRADE OF SERVICE REQUIRED (e.g. 1 or 5) ";
180     INPUT GSRVC
190     '*****************************************************************
200     '                   CALCULATIONS
210     '*****************************************************************
220                         'HOURS IN A MONTH
230     MHRS = (MCLLS * CLNGTH)/3600
240                         'HOURS IN THE PEAK HOUR
250     PHRS = (MHRS/MDAYS) * (PEAK/100)
260                         'CALLS IN THE PEAK HOUR
270     PCLLS = ((PHRS * 3600)/CLNGTH)
280                         'ERLANGS IN THE BUSY HOUR
290     RLNGS = PHRS
300     PRINT @820," PLEASE WAIT--RESULT IS BEING CALCULATED "
310     '*****************************************************************
320     '                   CALCULATE ERLANG B
330     I=0:P=1:P1=1
340     DIM X(1000)         'ARRAY TO HOLD SERVICE GRADES.
350     I = I + 1
360     PRINT @913," LINE   ";I
370     P = P * (RLNGS/I)
380     P1 = P1 + P
390     P3 = P/P1
400     X(I) = P3           'STORE THE GRADE OF SERVICE
410     IF P3 > 0 AND P3 < (GSRVC/100) THEN 440
420     IF P > 1.0E+5 THEN:P=P/1.0E+5:P1=P1/1.0E+5
430     GOTO 350
440     '
450     '*****************************************************************
460     '         CALCULATE HOURS PER LINE
470     '*****************************************************************
480     C=0
490     DIM L(1000)                 'ARRAY TO HOLD HOURS PER LINE
500     FF = PHRS                   'SET OFFERED EQUAL TO BUSY HOUR
510     FOR J = 1 TO I
520     C=C+1
```

```
530    OVF = PHRS * X(C)        'OVERFLOW EQUALS OFFERED TIME P FACTOR
540    L(C) = FF-OVF    'CARRIED EQUALS BSYHRS TOTAL MINUS THE OVERFLOW
550    FF =  OVF        'NEW AMOUNT OFFERED EQUALS OFFERED MINUS CARRIED
560    NEXT J
570    C=0
580    FOR J = 1 TO I
590    C=C+1                    'COUNTER FOR LINES
600    PRCT = PRCT + L(C)       'ADD UP HOURS OF TRAFFIC CARRIED PER LINE
610    NEXT J
620    '****************************************************************
630    '                        DISPLAY SECTION
640    '****************************************************************
650    CLS:INPUT "HIT ENTER TO DISPLAY GRADE OF SERVICE";Z:CLS
660    K = 0
670    PRINT @100," GRADE OF SERVICE "
680    FOR J = 1 TO I
690    K = K + 1
700    PRINT @320+(K*10),X(J)
710    IF K >159 THEN K = 1:CLS
720    NEXT J
730    PRINT @170," LINES REQUIRED FOR DESIRED GRADE OF SERVICE = ";I
740    PRINT @1600,""
750    INPUT "HIT ENTER TO DISPLAY HOURS CARRIED PER LINE";Z:CLS
760    PRINT @100," HOURS CARRIED IN THE PEAK HOUR PER LINE "
770    K = 0
780    FOR J = 1 TO I
790    K = K + 1
800    PRINT @240+(K*10),L(J)
810    IF K > 150 THEN K = 1:CLS
820    NEXT J
```

```
10 IF H$="H" THEN PRINT"FOR A MAP OF YOUR WATS ZONE COVERAGE."
20 CLS:CLEAR99:GOSUB3080
30 CLS:PRINT @400,"";
40 CLEAR:DEFDBL A-Q:DEFDBL S-Z
50 PRINT"HIT ANY KEY, OTHER THAN 'H' OR 'A' TO BEGIN A STANDARD RUN"
60 PRINT"TYPE THE LETTER 'H' FOR HELP WITH DETAILED INSTRUCTIONS   ":
70 PRINT"TYPE THE LETTER 'A' FOR AN ABBREVIATED RUN FOR EXPERIENCED USERS"
80 H$=INPUT$(1)
90 CLS
100 Q9=0:L1=0:L2=0:L3=0:C1=0:DA=0:D6=0:NA=0:N6=0:EA=0:E6=0
110 DF=0:DS=0:DT=0:DL=0:EF=0:ES=0:ET=0:EL=0:C2=0:C3=0:C4=0
120 CT=0:E1=0:E2=0:E3=0:E4=0:E5=0:N1=0:N2=0:TT=0:X1=0:X2=0
130 X3=0:X4=0:XD=0:X5=0:X6=0:X7=0:X8=0
140 IF H$="H" THEN PRINT @800,"TYPE THE WORD 'IN' TO ANALYZE THE USAGE COSTS ";
150 IF H$="H" THEN PRINT"INCOMING (800) WATS CALL"
160 IF H$="H" THEN PRINT"TYPE THE WORD 'OUT' TO ANALYZE THE USAGE COSTS FOR ";
170 IF H$="H" THEN PRINT"OUTGOING WATS CALL"
180 IF V8=1 THEN:PRINT @457,IO$
190 PRINT @420,"";:INPUT "ENTER 'IN' OR 'OUT' WATS ANALYSIS  ";IO$
200 IF IO$<>"IN" AND IO$<>"OUT" THEN 190'CHECK FOR ERROR
210 CLS
220 IF H$="H" THEN:CLS:PRINT @800, "THE WATS TARIFF IS DIVIDED INTO ZONES WITH";
230 IF H$="H" THEN PRINT"EACH ZONE FROM 1 THROUGH 6 COVERING A LARGER AREA ";
240 IF H$="H" THEN PRINT"OF THE COUNTRY.  CONTACT YOUR AT&T REPRESENTATIVE ";
250 IF V8=1 THEN:PRINT @538,A;
260 PRINT @413,:INPUT"ENTER WATS ZONE NUMBER:   1, 2, 3, 4, 5 OR 6 TO ANALYZE  ";A
270 IF A<1 OR A>6 THEN 260
280 CLS
290 IF H$="A" THEN 440
300 PRINT"01 = ALABAMA     13 = ILLINOIS-N  25 = MINN     37 = N. CAROLINA 49 = TEXAS-E"
310 PRINT"02 = ARIZONA     14 = ILLINOIS-S  26 = MISS     38 = N. DAKOTA   50 = TEXAS-S"
320 PRINT"03 = ARKANSAS    15 = INDIANA     27 = MISSOUR   39 = OHIO-N      51 = TEXAS-W
330 PRINT"04 = CALIF-N     16 = IOWA        28 = MONTANA 40 = OHIO-S      52 = UTAH"
340 PRINT"05 = CALIF-S     17 = KANSAS      29 = NEBRASKA  41 = OKLAHOMA    53 = VERMONT"
350 PRINT"06 = COLARADO    18 = KENTUCKY    30 = NEVADA  42 = OREGON      54 = VIRGINIA"
360 PRINT"07 = CONNECT     19 = LOUISIANA   31 = NEW HAM 43 = PENN-E      55 = WASH"
370 PRINT"08 = DELAWARE    20 = MAINE       32 = NEW JER   44 = PENN-W      56 = W. VIR"
380 PRINT"09 = D.C.        21 = MARYLAND    33 = NEW MEXIC 45 = R.I.        57 = WISCONSIN"
390 PRINT"10 = FLORIDA     22 = MASS        34 = N YORK-NE 46 = S. CAR      58 = WYOMING"
400 PRINT"11 = GEORGIA     23 = MICHIGAN-N  35 = N YORK-SE 47 = S. DAKOTA   "
410 PRINT"12 = IDAHO       24 = MICHIGAN-S  36 = N YORK-W  48 = TENN"
420 IF H$="H"THEN PRINT @1200,"LOCATE YOUR STATE ON THE LIST ABOVE, TYPE IN ";
430 IF H$="H" THEN PRINT"THE NUMBER CODE FOR THAT STATE AND HIT THE ENTER KEY";
440 IF V8=1 THEN:PRINT @1727,B
450 PRINT @1600,"":INPUT "ENTER NUMBER OF YOUR STATE FROM THE LIST ABOVE";B
460 IF B<1 OR B>59 THEN 280
470 CLS
480 IF V8=1 THEN:PRINT @360,M$
490 PRINT @300,:INPUT "ENTER MONTH UNDER ANALYSIS (OPTIONAL)";M$:PRINT
500 IF V8=1 THEN:PRINT @517,N$
510 PRINT@480,"";:INPUT "ENTER PROFIT CENTER NAME (OPTIONAL)";N$:PRINT
520 X$=CHR$(160)
530 PRINT @1600,STRING$(42,X$):PRINT @1600,"ENTER ALL NUMERICAL VALUES WITHOUT COMMAS."
540 Q9=Q9+1:IF Q9>5 THEN 550ELSE 530
550 IF H$="H"THEN PRINT @1680,"THE 'HOURS OF USAGE' REPRESENTS THE TOTAL ";
560 IF H$="H"THEN PRINT"AMOUNT OF CALLING TRAFFIC HANDLED DURING THE MONTH";
570 IF V8=1 THEN:PRINT @685,DX
580 PRINT @640,;:INPUT "ENTER TOTAL HOURS OF USAGE FROM 8 AM TO 5 PM";DX:DYHRS=DX
590 IF V8=1 THEN:PRINT @766,CX
600 PRINT @720,;:INPUT "ENTER TOTAL NUMBER OF CALLS FROM 8 AM TO 5 PM";CX:C7=CX
```

```
610 IF C7 = 0 THEN PRINT"YOU MUST ENTER SOME CALL VOLUME TO ANALYZE":GOTO 580
620 P1=(DYHRS*3600)/C7:L1=P1
630 IF P1<60 THEN P2=(60/P1):DYHRS=(DYHRS*P2):G1=1:REM MIN BILL CORRECTION
640 IF V8=1 THEN:PRINT@926,EX
650 PRINT @880,;:INPUT "ENTER TOTAL HOURS OF USAGE FROM 5 PM TO 11 PM";EX:EVENINGHRS=EX
660 IF V8=1 THEN:PRINT @1007,CV
670 PRINT @960,;:INPUT "ENTER TOTAL NUMBER OF CALLS FROM 5 PM TO 11 PM";CV:C8=CV
680 IF EV=0 THEN 710
690 Q1=(EVENINGHRS*3600)/C8:L2=Q1
700 IF Q1<60 THEN Q2=(60/Q1):EV=EV*Q2:G2=1
710 IF V8=1 THEN PRINT @1166,NX
720 PRINT @1120,;:INPUT "ENTER TOTAL HOURS OF USAGE FROM 11 PM TO 8 AM";NX:NIGHTHRS=NX
730 IF V8=1 THEN:PRINT @1247,CZ
740 PRINT @1200,;:INPUT "ENTER TOTAL NUMBER OF CALLS FROM 11 PM TO 8 AM";CZ:C9=CZ
750 IF NI=0 THEN 790
760 O1=(NIGHTHRS*3600)/C9:L3=O1
770 IF O1<60 THEN O2=(60/O1):NI=NIGHTHRS*O2:G3=1:REM MIN BILL CORRECTION
780 PRINT
790 PRINT:PRINT"TYPE IN 'Y' IF ALL INFORMATION IS CORRECT, OTHERWISE TYPE IN 'N'.    ";
800 I$=INPUT$(1):IF I$="N" THEN 580
810 IF I$<>"Y" THEN 820ELSE 830
820 IF I$<>"N" THEN 580
830 IF H$<>"H" THEN 970ELSE CLS
840 PRINT"THIS SECTION CALCULATES THE AVERAGE NUMBER OF WATS LINES USED"
850 PRINT"DURING THE MONTH.  IF 25 LINES WHERE IN FOR A FULL MONTH THEN ENTER"
860 PRINT"25 LINES FOR 30 DAYS.  30 DAYS EQUALS A MONTH UNDER THE WATS TARIFF."
870 PRINT"YOUR USAGE CHARGES WILL BE CALCULATED USING THESE FIGURES AND YOU ARE"
880 PRINT"BILLED ACCORDING TO THE AVERAGE NUMBERS OF LINES IN USE."
890 PRINT:PRINT"THE BASIC LINE CHARGES ARE FIGURES AUTOMATICALLY BY THE PROGRAM."
900 PRINT"EVEN IF A LINE IS IN FOR ONLY ONE OR TWO DAYS YOU ARE CHARGED THE"
910 PRINT"FULL MONTHLY BASIC RATE.  WHEN YOU HAVE COMPLETED ENTERING THE"
920 PRINT"NUMBER OF LINES YOU USED THEN ENTER A '0' WHEN THE PROGRAM ASKS"
930 PRINT"YOU TO 'INPUT THE NUMBER OF LINES.'
940 PRINT
950 PRINT"WHEN YOU HAVE READ THE DIRECTIONS HIT THE 'ENTER' KEY"
960 K$=INKEY$:IF K$="" THEN 960
970 CLS
980 H=0:WATSL=0:L=0:D=0:S=0:W=0
990 IF V8=1 THEN:PRINT @361,H
1000 PRINT @340,;:INPUT"NUMBER OF LINES =   ";L
1010 IF L=0 GOTO 1050
1020 IF V8=1 THEN:PRINT @526,D
1030 PRINT @500,;:INPUT"FOR THIS MANY DAYS =    ";D
1040 PRINT @900,; "ENTER '0' TO END INPUT"
1050 S=L*D:W=W+S:H=H+L:IF L <>0 GOTO 1000
1060 WATSL = W/30:IF WATSL=0 THEN PRINT @40,"YOU MUST ENTER SOME LINES":GOTO 1000
1070 IF A$="N" THEN PRINT @693,STRING$(20,160)
1080 PRINT @660,"AVERAGE LINES FOR THE MONTH    = ";WATSL
1090 IF V8=1 THEN:PRINT @1745,MI
1100 PRINT @1640,"":INPUT "TOTAL MISCELLANEOUS COSTS THIS MONTH";MISC
1110 PRINT "IS THE INFORMATION CORRECT? ENTER 'Y' OR 'N'";
1120 A$=INPUT$(1):IF A$="Y" THEN 1140ELSE 980
1130 IF A$<>"OK" THEN CLS:GOTO 980
1140 CLS:PRINT:PRINT:PRINT:PRINT:PRINT TAB(30)"RUNNING PROGRAM"
1150 REM REM
1160 REM REM             HOURLY BREAKDOWN ANALYSIS
1170 REM REM
1180 DAVR=(DYHRS/WATSL)
1190 D6=DAVR
1200 EAVR=(EVENINGHRS/WATSL)
```

```
1210 E6=EAVR
1220 NAVR=(NIGHTHRS/WATSL)
1230 N6=NAVR
1240 IF DAVR<15 THEN DFIRST=DAVR:DAVR=(DAVR-DAVR)
1250 IF DAVR>=15 THEN DFIRST=15:DAVR=(DAVR-15)
1260 IF DAVR<25 THEN DSECND=DAVR:DAVR=(DAVR-DAVR)
1270 IF DAVR>=25 THEN DSECND=25:DAVR=(DAVR-25)
1280 IF DAVR<40 THEN DTHIRD=DAVR:DAVR=(DAVR-DAVR)
1290 IF DAVR>=40 THEN DTHIRD=40:DAVR=(DAVR-40)
1300 IF DAVR>0 THEN DLAST=DAVR:DAVR=0
1310 IF EAVR<15 THEN EFIRST=EAVR:EAVR=(EAVR-EAVR)
1320 IF EAVR>=15 THEN EFIRST=15:EAVR=(EAVR-15)
1330 IF EAVR<25 THEN ESECND=EAVR:EAVR=(EAVR-EAVR)
1340 IF EAVR>=25 THEN ESECND=25:EAVR=(EAVR-25)
1350 IF EAVR<40 THEN ETHIRD=EAVR:EAVR=(EAVR-EAVR)
1360 IF EAVR>=40 THEN ETHIRD=40:EAVR=(EAVR-40)
1370 IF EAVR>0 THEN ELAST=EAVR:EAVR=0
1380 IF NAVR>0 THEN NAVR=NAVR
1390 REM REM            COST ANALYSIS
1400 REM REM
1410 REM REM            GET THE COST VARIABLES
1420 REM REM
1430 GOSUB 2520
1440 REM REM
1450 REM REM            DAY RATE COST ANALYSIS
1460 C1DAY=(DFIRST*R1DAYRATE)*WATSL:REM FIRST RATE STEP CHARGE TIMES LINES
1470 C2DAY=(DSECND*R2DAYRATE)*WATSL:REM SECOND RATE STEP CHARGE TIMES LINES
1480 C3DAY=(DTHIRD*R3DAYRATE)*WATSL:REM THIRD RATE STEP TIMES LINES
1490 C4DAY=(DLAST*R4DAYRATE)*WATSL:REM LAST RATE STEP CHARGE TIMES LINES
1500 CTDAY=(C1+C2+C3+C4):REM TOTAL DAY COST
1510 REM REM
1520 REM REM TAB(2)EVENING COST ANALYSIS SECTION
1530 REM REM
1540 E1EVENING=(EFIRST*R5EVENRATE)*WATSL:REM FIRST RATE TIMES LINES
1550 E2EVENING=(ESECND*R6EVENRATE)*WATSL:REM SECOND RATE TIMES LINES
1560 E3EVENING=(ETHIRD*R7EVENRATE)*WATSL:REM THIRD RATE TIMES LINES
1570 E4EVENING=(ELAST*R8EVENRATE)*WATSL:REM LAST RATE TIMES LINES
1580 E5EVENING=(E1+E2+E3+E4)
1590 REM REM                 NIGHT COST ANALYSIS
1600 REM REM
1610 N1NIGHT=(NAVR*R9NIGHTRATE)
1620 N2NIGHT=(N1NIGHT*WATSL)
1630 REM REM
1640 REM REM            FINAL COST ANALYSIS ALL LINES
1650 REM REM
1660 TT=(CTDAY+E5EVENING+N2NIGHT):REM ADD HOURLY TOTALS
1670 TT=(TT+MISC)+(H * BASE):REM ADD MISC COSTS AND LINE BASE CHARGES
1680 TT=(TT*T2)+TT
1690 CLS
1700 X1=(DYHRS+EVENINGHRS+NIGHTHRS):X2=((BASE*H)*T2)+(BASE*H)
1710 XD=DYHRS/X1:XE=EVENINGHRS/X1:XN=NIGHTHRS/X1
1720 X3=(XD*X2)+CTDAY:X4=(XE*X2)+E5EVENING:X5=(XN*X2)+N2NIGHT
1730 X6=X3/C7:IF C8=0 THEN 1750
1740 X7=X4/C8:IF C9=0 THEN 1770
1750 IF C9=0 THEN 1770
1760 X8=X5/C9
1770 REM JUMP HERE IF DIVISION BY ZERO IS POSSIBLE
1780 REM REM
1790 REM REM            OUTPUT SECTION
1800 REM REM
```

```
1810 REM REM
1820 REM REM              CRT OUTPUT
1830 REM REM
1840 CLS
1850 PRINT TAB(25)"WATS COST ANALYSIS"
1860 PRINT:PRINT:PRINT TAB(2)"MONTH     =    ";M$,"PROFIT CENTER      =    ";N$
1870 PRINT:PRINT
1880 PRINT TAB(14)"AVERAGE";"       MONTHLY";"      AVERAGE";"     AVERAGE"
1890 PRINT"                 HOURS USAGE   USAGE COST   COST/CALL   CALL LENGTH   COST/SECOND"
1900 PRINT
1910 PRINT "8 TO 5",
1920 PRINT USING "###.#";D6;
1930 PRINT"    ";
1940 PRINT USING "$$#######,.#";CTDAY;
1950 PRINT"    ";
1960 PRINT USING "$$###.####";X6;
1970 PRINT"       ";
1980 PRINT USING "###.#";L1;
1990 PRINT TAB(1),
2000 IF L1=0 THEN 2020
2010 PRINT USING "$$#.######";X6/L1
2020 PRINT
2030 PRINT"5 TO 11";
2040 PRINT"         ";
2050 PRINT USING "###.#";E6;
2060 PRINT"    ";
2070 PRINT USING "$$#######,.#";E5;
2080 PRINT"    ";
2090 PRINT USING "$$###.####";X7;
2100 PRINT "       ";
2110 PRINT USING "###.#";L2;
2120 PRINT TAB(1),
2130 IF L2=0 THEN 2150
2140 PRINT USING "$$#.######";X7/L2
2150 PRINT
2160 PRINT"11 TO 8";
2170 PRINT"         ";
2180 PRINT USING "###.#";N6;
2190 PRINT"    ";
2200 PRINT USING "$$#######,.#";N2,
2210 PRINT "    ";
2220 PRINT USING "$$###.####";X8,
2230 PRINT "       ";
2240 PRINT USING "###.#";L3;
2250 IF L3=0 THEN 2280:PRINT "            ",
2260 PRINT TAB(1),
2270 PRINT USING"$$#.######";X8/L3
2280 PRINT:PRINT
2290 PRINT TAB(20)"WATS ZONE        =";A," STATE CODE  =",B
2300 PRINT
2310 PRINT TAB(20)"BILLABLE LINES    =  ";
2320 PRINT USING "########";H
2330 PRINT TAB(20)"USAGE TOTAL       =  ";
2340 PRINT USING "$$######,.##";E5+CT+N2
2350 PRINT TAB(20)"BASE COSTS        =  ";
2360 PRINT USING "$$######,.##";H*BASE
2370 PRINT TAB(20)"TOTAL COST        =  ";
2380 PRINT USING "$$######,.##";TT
2390 PRINT TAB(20)"TOTAL CALLS       =   ";
2400 PRINT USING "#######,";C7+C8+C9
```

```
2410 PRINT:INPUT"DO YOU WANT TO PRINT RESULTS?  ENTER 'YES' OR 'NO'";A$
2420 IF A$="NO" GOTO 2450
2430 REM REM                PRINTED OUTPUT
2440 SYSTEM "SCREEN"                'REM TRY TO PRINT THE SCREEN
2450 REM
2460 INPUT"DO YOU WANT ANOTHER RUN?  ENTER 'YES' OR 'NO'";A$
2470 IF A$="YES" THEN V8=1:GOTO 90
2480 CLS
2490 END
2500 REM
2510 STOP
2520 REM                            FILE CONTROL FOR RATE TABLES
2530 IF BX<>B THEN 2560
2540 IF V8=1 AND BX=B THEN 2660'SKIP FILE SEARCH IF NO CHANGE
2550 STOP
2560 REM
2570 IX$="R":BX=B                   'SET THE RERUN FLAG
2580 REM                            OPEN "STEP/DAT" STATE CODE ZONE TABLES
2590 OPEN "D",1,"STEP/DAT",12
2600 FIELD 1,2 AS R1$,2 AS R2$,2 AS R3$,2 AS R4$,2 AS R5$,2 AS R6$
2610 REM
2620 REM                            RETRIEVE THE ZONE CODES FOR THE STATE
2630 REM
2640 GET 1,B
2650 V1=CVI(R1$):V2=CVI(R2$):V3=CVI(R3$):V4=CVI(R4$):V5=CVI(R5$):V6=CVI(R6$)
2660 IF IX$=IO$ AND AA=A THEN 2850
2670 IF IO$= "OUT" THEN 2850
2680 IX$=IO$:AA=A
2690 OPEN "D",2,"EIGHT/DAT",45
2700 FIELD 2,5 AS R1$,5 AS R2$,5 AS R3$,5 AS R4$,5 AS R5$,5 AS R6$,5 AS R7$,5 AS R8$,5 AS R9$
2710 REM
2720 REM                            RETRIEVE THE IN 800 WATS
2730 IF A=1 THEN W=V1
2740 IF A=2 THEN W=V2
2750 IF A=3 THEN W=V3
2760 IF A=4 THEN W=V4
2770 IF A=5 THEN W=V5
2780 IF A=6 THEN W=V6
2790 GET 2,W
2800 R1=CVS(R1$):R2=CVS(R2$):R3=CVS(R3$):R4=CVS(R4$):R5=CVS(R5$)
2810 R6=CVS(R6$):R7=CVS(R7$):R8=CVS(R8$):R9=CVS(R9$)
2820 CLOSE
2830 BASE=35.35:T2=.02
2840 RETURN
2850 REM         OPEN THE OUT WATS TABLE
2860 IF IZ$=IO$ AND AA=A THEN RETURN
2870 IF IX$=IO$ AND AA=A THEN RETURN
2880 IZ$=IO$:AA=A
2890 OPEN "D",3,"OUTRATE/DAT",45
2900 FIELD 3,5 AS R1$,5 AS R2$,5 AS R3$,5 AS R4$,5 AS R5$,5 AS R6$,5 AS R7$,5 AS R8$,5 AS R9$
2910 REM
2920 REM         RETRIEVE THE OUT CHARGES
2930 REM
2940 IF A=1 THEN W=V1
2950 IF A=2 THEN W=V2
2960 IF A=3 THEN W=V3
2970 IF A=4 THEN W=V4
2980 IF A=5 THEN W=V5
2990 IF A=6 THEN W=V6
3000 GET 3,W
```

```
3010 R1=CVS(R1$):R2=CVS(R2$):R3=CVS(R3$):R4=CVS(R4$):R5=CVS(R5$)
3020 R6=CVS(R6$):R7=CVS(R7$):R8=CVS(R8$):R9=CVS(R9$)
3030 CLOSE
3040 BASE = 30.40:T2=.02:                'BASIC LINE CHARGES AND TAX
3050 'TAX AND BASIC CHARGES MUST BE ADJUSTED FOR YOUR STATE & TARIFF
3060 RETURN
3070 END
3080 Y=80:X=8:Z$=CHR$(149)
3090 PRINT@0,STRING$(80,Z$);
3100 PRINT@80,STRING$(80,Z$);
3110 PRINT@Y,STRING$(X,Z$);:Y=Y+76:X=X+4
3120 IF X<95GOTO3110ELSEPRINT@Y,STRING$(88,Z$);
3130 PRINT@265,"WATS ANALYZER";:
3140 PRINT@412,"STEVEN C. GRANT AND YVONNE BROOKS GRANT";:
3150 PRINT@578,"THE TELECOM LIBRARY, 1985";:
3160 FORJ=1TO2000:NEXT:RETURN
```

```
10 REM                     WATS ZONE RATE TABLE
20 REM                     FILE NAME:  "STEP/CMD"
30 REM                     BUILDS THE "STEP/DAT" FILE FOR ALL STATES
40 REM
50 OPEN "D",1,"STEP/DAT",12
60 PRINT "ENTER '0' TO END FILE UPDATE"
70 INPUT "ENTER FIELD NUMBER ";X
80 IF X=0 GOTO 180
90 FIELD 1, 2 AS R1$,2 AS R2$,2 AS R3$,2 AS R4$,2 AS R5$,2 AS R6$
100 INPUT "ENTER FIRST FIELD DATA";Y:LSET R1$=MKI$(Y)
110 INPUT "ENTER SECOND FIELD DATA";Y:LSET R2$=MKI$(Y)
120 INPUT "ENTER THIRD FIELD DATA";Y:LSET R3$=MKI$(Y)
130 INPUT "ENTER FOURTH FIELD DATA";Y:LSET R4$=MKI$(Y)
140 INPUT "ENTER FIFTH FIELD DATA";Y:LSET R5$=MKI$(Y)
150 INPUT "ENTER SIXTH FIELD DATA";Y:LSET R6$=MKI$(Y)
160 PUT 1,X:IF X=0 THEN CLOSE:IF X=0 THEN END
170 GOTO 70
180 IF X=0 THEN END
190 END
```

```
10 REM                     WATS ZONE RATE TABLE
20 REM
30 REM                     FILE NAME "OUTRATE/CMD" BUILDS CHARGE TABLE
40 OPEN "D",2,"OUTRATE/DAT",45
50 INPUT "ENTER FIELD NUMBER ";X
60 IF X=0 GOTO 180
70 FIELD 2, 5 AS R1$,5 AS R2$,5 AS R3$,5 AS R4$,5 AS R5$,5 AS R6$,5 AS R7$,5 AS R8$,5 AS
80 INPUT "ENTER FIRST FIELD DATA";Y:LSET R1$=MKS$(Y)
90 INPUT "ENTER SECOND FIELD DATA";Y:LSET R2$=MKS$(Y)
100 INPUT "ENTER THIRD FIELD DATA";Y:LSET R3$=MKS$(Y)
110 INPUT "ENTER FOURTH FIELD DATA";Y:LSET R4$=MKS$(Y)
120 INPUT "ENTER FIFTH FIELD DATA";Y:LSET R5$=MKS$(Y)
130 INPUT "ENTER SIXTH FIELD DATA";Y:LSET R6$=MKS$(Y)
140 INPUT "ENTER SEVENTH FIELD DATA";Y:LSET R7$=MKS$(Y)
150 INPUT "ENTER EIGHTH FIELD DATA";Y:LSET R8$=MKS$(Y)
160 INPUT "ENTER NINTH FIELD DATA";Y:LSET R9$=MKS$(Y)
170 PUT 2,X
180 IF X=0 THEN CLOSE
190 IF X=0 THEN END
200 GOTO 50
210 END
```

```
   REM                  WATS ZONE RATE TABLE
20 REM
30 REM                  FILE NAME "EIGHT/CMD" BUILDS THE CHARGE TABLE
40 OPEN "D",2,"EIGHT/DAT",45
50 INPUT "ENTER FIELD NUMBER 1-10";X
60 IF X=0 GOTO 180
70 FIELD 2, 5 AS R1$,5 AS R2$,5 AS R3$,5 AS R4$,5 AS R5$,5 AS R6$,5 AS R7$,5 AS R8$,5 AS R9$
80 INPUT "ENTER FIRST FIELD DATA";Y:LSET R1$=MKS$(Y)
90 INPUT "ENTER SECOND FIELD DATA";Y:LSET R2$=MKS$(Y)
100 INPUT "ENTER THIRD FIELD DATA";Y:LSET R3$=MKS$(Y)
110 INPUT "ENTER FOURTH FIELD DATA";Y:LSET R4$=MKS$(Y)
120 INPUT "ENTER FIFTH FIELD DATA";Y:LSET R5$=MKS$(Y)
130 INPUT "ENTER SIXTH FIELD DATA";Y:LSET R6$=MKS$(Y)
140 INPUT "ENTER SEVENTH FIELD DATA";Y:LSET R7$=MKS$(Y)
150 INPUT "ENTER EIGHTH FIELD DATA";Y:LSET R8$=MKS$(Y)
160 INPUT "ENTER NINTH FIELD DATA";Y:LSET R9$=MKS$(Y)
170 PUT 2,X
180 IF X=0 THEN CLOSE
190 IF X=0 THEN END
200 GOTO 50
210 END
```

A MANAGEMENT GUIDE TO AUTOMATIC CALL DISTRIBUTORS

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The Teleconnect Guide To Automatic Call Distributors

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TELECONNECT Magazine

TELECONNECT, a monthly telecommunications magazine, is the most popular and widely read publication among sellers and users of business telecommunications. It features practical, "How-to-do-it" articles to help its readers (1) Sell or Choose; (2) Install or Use, (3) Maintain or Manage their communications systems

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THE TELEMANAGEMENT REPORT

Volume 2, Number 5 (15) — June 1984

IN THIS ISSUE:

Special Feature

THE AUTOMATED SWITCHBOARD ATTENDANT

Part One: Introduction

As more and more computer technology is applied to telephone systems, and the feature lists get longer and longer, purchasers of telephone systems are confronted with a major question: how can these new features be used? Often, it seems, the engineers have invented solutions to problems which don't exist, features which do things no one wants to do.

In fact, it could be said that one of the most important functions of a telecommunications manager in the 1980s is devising ways to use telecommunications technology, much of it new and untried, to assist their organizations to achieve their business goals. The challenge is to take a new technology, feature or product, and see how it can be used in ways no telecom salesman ever imagined, to make your business function better and more profitably than before.

To show how this can be done, we're taking an extended look at a product which is not only new, it is very different from any product we've seen before: the Dytel Automated Switchboard Attendant. We carried a short article on this system last month, but our brief account seems to have raised as many questions as it answered. Some readers asked, 'How does it work?' but more asked, 'What could it be used for?' Dytel has designed a product which is very different from anything else on the market: so different, that it is difficult to define a market niche for it.

Editor **IAN ANGUS**
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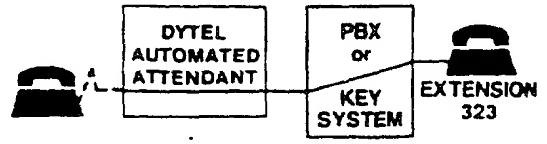
to its programmed instructions) to the PBX, and the caller is put through. If the caller fails to dial, or enters digits the system doesn't recognize, the call is routed to the switchboard attendant for normal processing.

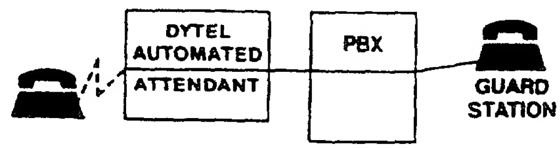
ASA Direct Extension Call



1. External caller dials your company's telephone number.
2. The system answers and gives your customized message
3. The user dials 323 during or immediately after the message.
4. The system forwards 323 to your PBX which completes the connection

In effect, the ASA gives you a form of Direct-Inward-Dialing without the expense of DID trunks and circuit cards. For organizations which prefer to have an operator handle all incoming calls during business hours, the ASA can be used for night answering.

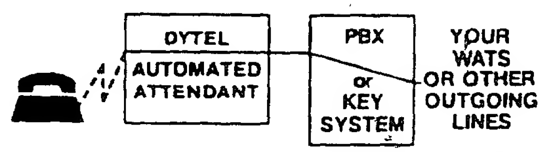
Night and Off-Hours Answering with ASA



1. After hours, or at night, the user dials your office and hears the standard message or an optional night message
2. The user needs assistance, and either dials 0 or waits. (If the user doesn't need assistance, he may make a direct extension call.)
3. The system dials the night telephone number to the PBX.
4. The PBX completes the call to the night destination such as a guard station, computer room or even to a remote location

It could also be used as a security system to allow approved callers access to WATS lines. And, because it can delete digits from the number received from the caller, and add digits from its memory, it can be used to reroute incoming calls to remote locations.

Off Premise WATS use with Security



1. After hearing your customized greeting, the user dials his security code
2. The system checks to see if the security code is valid
3. If the code is valid, the system allows the user to dial the WATS trunk access code and forwards the number to the PBX.
4. The user completes his call on your WATS or other outgoing lines

This brief introduction shows how Dytel's engineers imagined the system being used. The following article, reprinted with permission and with some changes from Teleconnect magazine, provides some further insight into possible applications.

We don't normally devote major reports to new telecom products from small companies. Experience shows that most have very short lives: they get some publicity, then the product (and often the company) vanishes. But we've decided to make an exception in this case. Quite apart from its chances for success, which we'll let the market decide, the Dytel Automated Switchboard Attendant is a classic case of a 'solution in search of a problem.' Some very clever technical people, working in a lab, have produced the product, but only people experienced in real offices, with real telephone systems, can determine appropriate applications. We want to show how a bit of creative thought can identify practical uses for what initially seems to be an esoteric and unusable product.

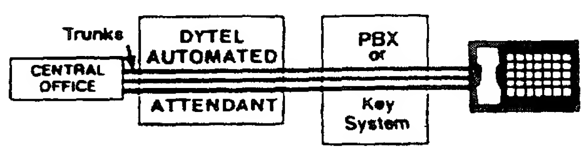
'a solution in search of a problem'?

We begin with a look at the product itself: what it does, and how it does it. Then, courtesy of Harry Newton and the staff of Teleconnect magazine, the results of a brainstorming session which produced 21 possible uses for the system, most of which were never imagined by the engineers who built it. Then a brief report on an actual installation we found. And finally, a brief description of a competitive product, which adds a new dimension to a the concept.

Part Two: Basic ASA Concepts

The Dytel Automated Switchboard Attendant (ASA) is a micro-processor controlled device which is designed to work with PBX systems and with some hybrid electronic key systems. It is installed on your premises, between the telephone company's trunks and your PBX.

ASA Block Diagram



The connection to your PBX may be to a standard PBX station line card, or to a Direct-Inward-Dialing (DID) trunk card. The station card will usually be less expensive, but it may not work in every case.

When a call is placed to your main number, the caller is answered by a digitized voice message:

Digitized voice

'Thank you for calling XYZ Company. If you are calling from a push-button phone, you may dial your party's extension number during this message. If you need assistance, please wait and an operator will help you. You may dial during this message. For sales, please dial 1.'

If the caller enters an extension number from a touchtone phone, the ASA forwards the digits (modifying them if necessary according

Part Three: 21 Uses for the Automated Attendant

Edith is this little black box that attaches to the front of a PBX and pretends to be an attendant. You call the PBX's main number. Edith, the little black inanimate box, answers with a smile. 'Thanks for calling. If you want anyone, pushbutton their extension number NOW. Don't wait for me to stop talking. If you don't know their extension, hang on. Our live attendant will come on in a second, if we can get her back from making us coffee.'

Each Edith will answer up to 48 trunks. You can stack Ediths forever. Which, we gather, is more technical than Freudian.

What can you do with Edith? This is the fun part. The creative part. First, you have to know, she can accept up to and respond to 6 digits and you can change recordings quickly.

This is what we thought of:

DID substitute

1. REPLACEMENT FOR DID. The price of Direct Inward Dialing central office trunks is skyrocketing. In some places, it's downright prohibitive. And getting worse. (We're not quite sure how you can get 'worse' than prohibitive. But you get the message.) Replacement for DID trunks is the 'traditional' Edith benefit.

INWATS control

2. IN-WATS COST ALLOCATOR. Outlying offices call in. Are answered by Edith. Punch in an authorization (also called a 'billing') number. Helps to allocate phone bills because the external incoming call now becomes internal, captured by the PBX's SMDR.

Cost reducer

3. IN-WATS COST REDUCER. Some companies have separate listed WATS numbers for incoming so callers are directly routed to specific departments. This destroys economies of scale, forces you to buy more WATS lines and degrades your level of service. One number, with Edith directing callers to specific departments, will work nicely.

Add extra trunks

4. TRUNK EXPANDER. A frequent problem on many PBX systems is that the PBX is near trunk capacity. With Edith you add as many incoming trunks as there are unused line extensions. This assumes, of course, that you have adequate speech paths, because Edith can allow incoming trunks to access the PBX through the line extensions.

Paging

5. MOBILE TELEPHONE PAGING HELPER. Mobile phone users dial into a central location. Edith gives message and callers dial number corresponding to party they want to reach. They can punch in sufficient digits to include a billing code and an account code.

Overflow operator

6. OVERFLOW CALL HANDLER. People call into a central number. The PBX is overwhelmed with calls. Edith can screen people. Callers get a message to dial '1' for this, '2' for that, etc. Some of them can be forwarded to another PBX or an other number. This can be useful for after-hours calling, to take advantage of time

zones and offices that are still open. It may be cheaper to shunt the few calls arriving after 5 p.m. to California on the WATS line than to staff the PBX for two or three more hours.

Telemarketing response

7. TELEMARKETING RESPONDEE HANDLER. A telemarketing operation generates (probably by computer) several simultaneous calls to the public. Perhaps 25% of the called parties need more information and immediately call on toll-free IN-WATS for further information. Edith can ask simple questions, then move them to the specific departments they need.

Insurance

8. INSURANCE COMPANY HANDLER. Insurance rules vary widely from one state to another. You can tell callers to punch in their area codes. Edith will then route the calls to the appropriate expert on that state.

Toll control

9. INTERNAL TOLL RESTRICTION. Many of the older PBXs don't have toll restriction other than by '0' or '1' restrict. You can turn Edith around and use its 6-digit translation for routing, or not routing internal calls.

Shared service

10. CONDO CALL HANDLER. Condos and co-ops in the US can now share or resell telephone service. Drop 500 single, increasingly expensive residential lines. Replace them with 50 PBX trunks in rotary. Use Edith as DID for residential. You might have business. Depends on cost of local trunks, usage etc.

Hotel-Motel

11. OFF-HOURS HOTEL OR MOTEL SERVICE. You can't get a sandwich at most hotels after 10 p.m. Now the theory is take the full-time operator away and allow incoming calls to punch directly into their rooms. If they don't know the rooms, then punch '4' and wake up the proprietor. Could save having an operator. Most useful in hotels with permanent guests, or vacation hotels.

Polls

12. AUTOMATIC POLL TAKER. Radio station announces poll. Call this number. Punch in '1' for 'Yes,' '2' for 'No,' '3' for 'Don't know or don't care' and '4' for 'Please stop taking stupid polls and play some music.'

Cutovers

13. PBX CUT-OVER HELPER. Sometimes when business puts in a new phone system, they move their people off the old onto the new in phases. Edith will help the move by allowing callers on the old system to get employees on the new system. Sort of like forwarding, except that it's between two PBXs.

Multiple PBX control

14. MULTIPLE PBX ACCESS. One Edith can answer the phones for two companies, for two PBXs. This way we can have one automated and one live attendant, instead of several part-timers.

Overflow operator

15. OVERFLOW HANDLER. Some companies prefer to have their incoming calls handled by live operators. But they get busy. Edith can answer all calls not answered after three rings. Sort of like the recording on an ACD, except the caller can jump right into the company, if he knows that extension number.

Tenant calls

16. TENANT CALL HANDLER. Good for residential or business multiple tenant resale. Saves on normal PBX trunks. Saves on DID

numbers. Super application–if the numbers pan out. The economics of resale are tender.

Teleshopping

17. HOME SHOPPING - HOME BANKING. 'Want to buy a home in North Dallas, punch out 121. Want one in South Dallas, punch out 123.'

Network control

18. NETWORK ACCESS AUTHORIZER. Crude, but effective. Edith could do checks for both incoming and outgoing calls. It's not SMDR, though that could be tied in. But it's a simple, inexpensive way of cutting off gross abusers.

Client billing

19. INCOMING CLIENT CALL ACCOUNTER. A law firm has 15 lawyers. Each lawyer has his–her own assigned clients and their own assigned extension on the telephone system. The law firm does not want their clients to know they must first dial their account number. Joe, the lawyer, tells his clients how to reach him. For client number 14, e.g. assuming Joe's extension number is 12, he tells his client to reach him by dialing 1412. Edith prints the number for that call which identifies both client and his assigned lawyer.

Routing support

20. CALLING ROUTE HELPER. A state, a pipeline or a large company has a long distance network or pieces of a network. The user wants an easy–to–use numbering system. Normally, in such a tandem tie–line network, the user must dial zillions of digits and pauses. Edith can dial up to 20 digits, with pauses in response to a single or a few digits dialed into it. Sort of like a remote auto dialer.

Hospitals

21. HOSPITAL HELPER. In the day the calls can go directly to the hospital room—without a live operator—simply by punching in the extension or room number. At night time, Edith can switch and any patient room numbers dialed can go to a recording saying,'Patient room hours are over. Please call between 10 a.m. and 8 p.m.'

If you have more uses possible uses for Edith, call Dytel's Vice–President Marketing, James Marston, at 312–577–0962. This will give you a chance to try out the system — and we understand that he pays for innovative applications he hasn't thought of yet.

Part Four: An Automated Attendant in Dallas

So much for brainstorming. Has anyone really tried one? Dytel is a new company and the Automated Attendant is a new product, so real applications are hard to find. After some investigation, we found that Dallas–based telecommunications consultant Ken Nelson Associates had recommended and implemented one for one of his clients. Ken shared some of his experiences with us.

Dallas Museum of Art

Ken's client, the Dallas Museum of Art, presented some unique problems. The switchboard attendant was being swamped with requests for information which accounted for half of the volume of calls. The other half required rerouting. With the museum's move to a more central downtown location volume was expected to increase dramatically.

Taped message unacceptable

The easiest answer — a taped message at the main number giving commonly requested information and a number to call for other information — was not considered acceptable. Not only did it not provide the level of public service the museum required, but it often meant that long distance callers must incur additional expenses. On the other hand, Dytel's automated switchboard operator provided an innovative solution.

Solution

Today, the museum has 20 two-way trunks. Twelve are answered by the Dytel automatic switchboard attendant. The recorded message advises callers that they can direct dial if they know the extension that they want and have a push button phone. It also lists a number of commonly called extensions. If the caller keys in an extension, the system puts the call through. If no one answers or if the line is busy, the features of the museum's SL-1M PBX take over, rerouting the call to an answering position.

Since the system has been installed, traffic analysis indicates that of the 8000 calls received each week, 50% bypass the operator. The only continuing problem is the fact that many 'pushbutton' phones are not 'touchtone,' and this confuses some callers.

Part Five: Opcom Offers an Alternative

High technology, we've said before, is like a game of leapfrog: no one stays in front for long. Just when you think you're in the lead, someone passes you by, often with features you never dreamed about. If there is a market for products like Dytel's Automated Switchboard Attendant, then it won't be long before other companies enter that market.

VSAF System also offers automated answering

In fact, competition has already appeared, in the unlikely form of a Voice-Store-and-Forward system manufactured by Optimum Communications Inc., a Sunnyvale, California company. The OPCOM VX does what the Dytel ASA does: it answers incoming calls and allows callers to punch in an extension number, bypassing the operator entirely. As with the Dytel product, the caller can obtain operator assistance if necessary.

...with messaging

But OPCOM VX adds a new twist: if a caller reaches an extension that is busy or does not answer, he can choose to leave a voice message. Optimum is selling the system as an enhanced voice messaging system, rather than as an enhanced automated attendant — but the product is clearly aimed at the market Dytel wants.

and other features

At prices of $25,000 (US) and up, the OPCOM VX is considerably more expensive than Dytel's automatic switchboard attendant, but then Optimum's system offers a number of additional voice messaging features including: networking, message waiting notification, distribution lists with up to 100 recipients, and message reply and distribution.

The system can serve up to 1000 PBX or Centrex stations and is being sold to PBX users but negotiations are also in progress with several PBX manufacturers. The company is taking a fairly cautious approach to marketing, being concerned about providing

good support to distributors. Their strategy is to focus on segments with specialized applications. There are no plans yet for Canada. For more information, contact Optimum Communications, 408-749-1391, extension 46.

Rise and Fall of an Interco

GAVEX COMMUNICATIONS ON THE ROPES

Gavex, Number 14 last year ...

Last year, our 'Interconnect Industry in Canada' report named Vancouver-based Gavex Communications Corporation, as the fourteenth-largest interconnect company in the country. Gavex had $2-3 Million in 1982 telephone system sales, an installed base of 410 telephone systems (a total of 4,230 lines), and projected doubling of sales in 1983.

... is in trouble

On May 1, 1984, Gavex filed a proposal under the Bankruptcy Act, offering its creditors preferred shares in lieu of debt payment. Gavex owed over $2.5 Million, and had no current assets to cover those debts. Gavex's creditors will vote on this proposal on June 7. Tony Liebert of Campbell Sharp, the trustee handling Gavex's proposal, predicts that the creditors will reject it. If this happens, it will automatically put Gavex into bankruptcy.

What happened? How could a company go bankrupt while selling in an industry where total 1983 sales increased by 50% over the previous year?

Medium-sized firm problems

Two years ago we described the problems facing the 'medium-sized' interconnect firms (those with between $2 and $10 Million in annual sales). We said that firms in this group 'have, typically, very little in the way of capital resources: most are financed largely or even entirely by debt. They must grow or die...' In 1983 we predicted that one or two of this group might disappear in 1984 'through bankruptcy, merger, or both'. Gavex's problems aptly match our description and prediction.

Background

'Gavex, a Resource Corporation' started as a land development and resource exploration company. In 1982, it expanded into the interconnect field by purchasing franchise licenses for 'The Other Phone Store' in Kelowna and Kamloops. When the franchise company (J.G. Telephone Holding Co.) collapsed later in 1982, Gavex moved into the Vancouver market and took over the customer base of the former Vancouver franchisees by honoring customers' existing warrantees and maintenance agreements. This gave Gavex a base from which to project expanded sales in the Vancouver market in 1983.

That maneuver cost money. John Bellamy, Western Region Credit Manager for Nedco (the wholesale distributor from whom Gavex obtained its telephone equipment) estimates that Gavex lost $150,000 in this process. If Gavex's land development and resource business had been generating cash at that time, the company could probably have weathered this expansion cost. This appears not to

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cable data

VIA CABLE

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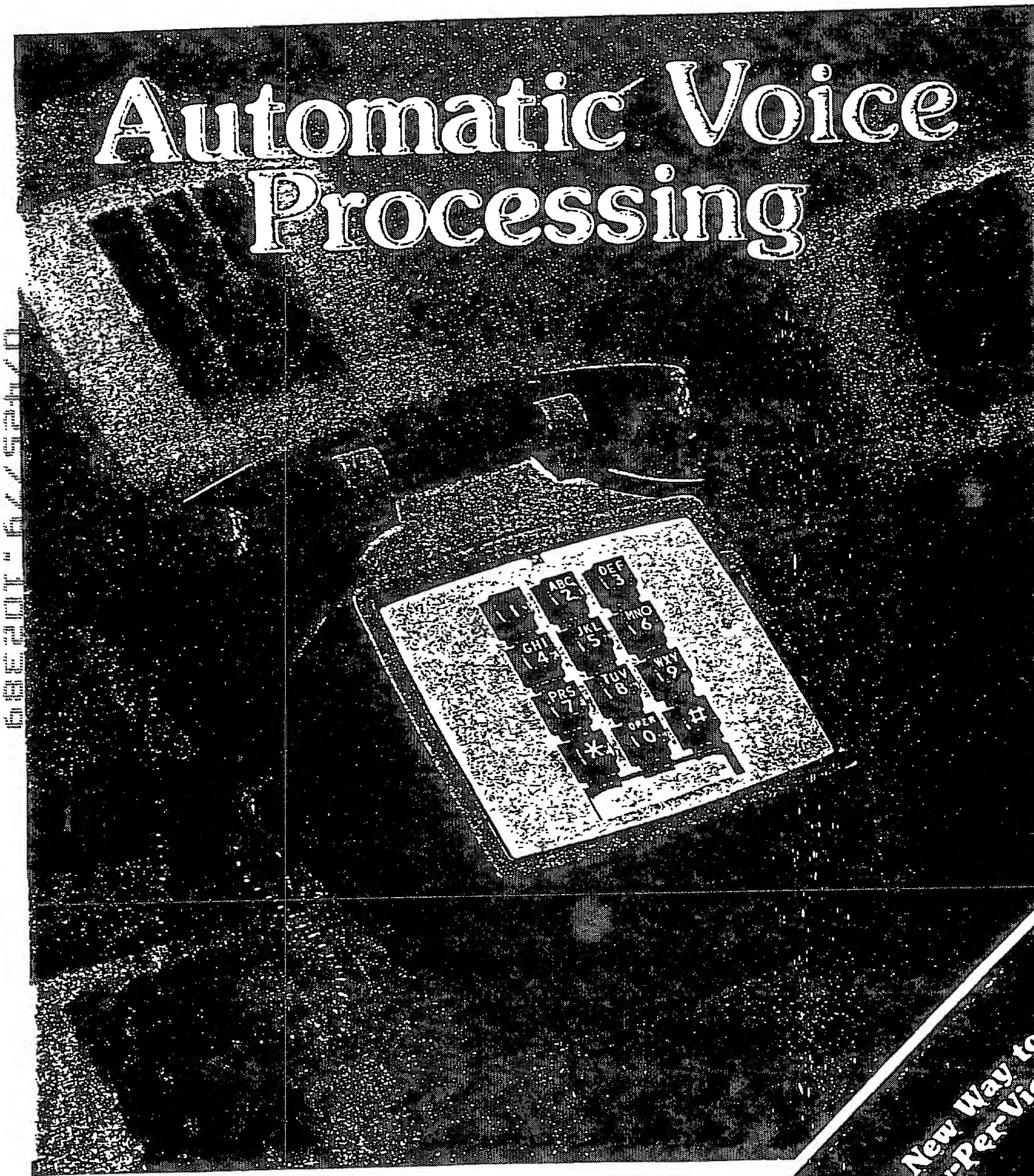


A New Way to Handle Pay-Per-View Orders

Audio Voice Processing Enhances the Pay-Per-View Ordering Process

Today, the key to effective management of just about any cable business is computer-based information. Calling up the database, entering information received from customers, and confirming orders are normal procedures of doing business for most on-line cable systems. However, with the new pay-per-view scenario comes increased activity. The whole order taking and information-entry process has to speed-up to become profitable. Operators are currently struggling with the ability to quickly process all those last-minute pay-per-view orders without employing additional personnel. . . and without losing any orders. There is a solution.

CableData has developed a new, automatic voice processing device designed to handle large-volume, pay-per-view customer orders without the conventional intervention of customer service representatives. Through the dynamic application of voice-response technology and one-way addressability, CableData designed the PHONE ENTRY PROCESSOR (PEP) which enables your subscribers to communicate directly with your computer database, thereby eliminating high personnel costs, errors, and system delays.

The PEP will lead your subscriber through order transactions, confirm entered data, and even respond to exceptions automatically. Your subscriber simply dials a special telephone number from any push-button telephone. The PEP utilizes a human-voice vocabulary to ask the customer specific questions relating to the transaction. The customer, in turn, responds by depressing appropriate buttons on the telephone. While the customer is communicating directly with the Tandem computer, and subsequently its data base, the computer is checking the various bits of information, i.e., account number, account status, payment history, etc., before it confirms and authorizes the delivery of the special event. And the PEP can accommodate as many phone lines as desired by cable operators.

Designed to be peripheral to CableData's on-line management information systems and its one-way addressable home terminal units (HTU), the PEP is also completely functional with other addressable converters manufactured by major vendors. However, if CableData's HTU is employed in the system, the pay-per-view process is further solidified. The HTU will visually confirm each step of the transaction and it will display a list of all special events the customer can choose from. From a marketing angle, the combination of the PHONE ENTRY PROCESSOR and HTU gives greater exposure of each pay-per-event offered by the cable system and increases the likelihood of an impulse purchase. To order a special event, the subscriber must enter a verification number which is obtainable only through the HTU, and then only after the account number has been verified and cleared, thereby increasing system security.

With the PEP, there's no need for cable operators to keep large staffs on-duty to provide 24-hour service. There's no need to invest heavily in training either.

Realizing that two-way addressability will not become a profitable reality until some time in the future, CableData offers cable operators an economically viable method of capitalizing on current one-way addressable technology and pay-per-view schemes with the PHONE ENTRY PROCESSOR. This hybrid system will set the stage for practical experience in the future application of two-way addressability. For more information on this new product, either stop by CableData's booth, #500, at the Western Show in Anaheim for a live demonstration, or contact the Marketing Department at (916) 485-2911. The PEP is functional with the On/Line Exclusive, On/Line Shared, and On/Line Mini Systems.

On-Line Users Meeting 1982

"The sales department is closed."

The second annual On-Line Users Meeting was held in Las Vegas on October 3-5 and attended by the majority of our on-line cable customers. "The sales department is closed," remarked Bob Mathews in his welcoming speech. "The purpose of this meeting is to inform you, not sell you." And indeed, several major announcements were made that were of significant interest to customers, not least among which were the company's newest plans for the HTU (CableData's one-way addressable converter), automatic voice processing, and CableData's intent to unbundle its software in customer-prescribed packages in 1983.

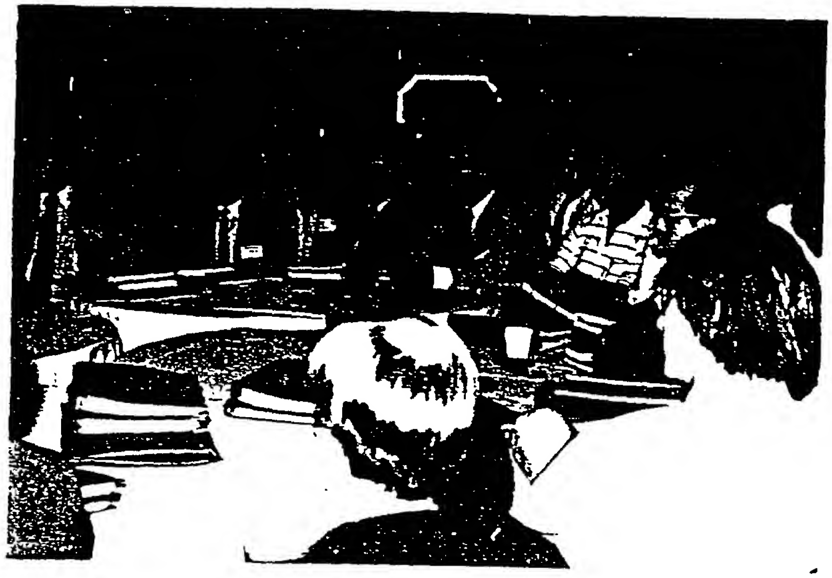
This year's meeting was characterized by an atmosphere of cooperativeness and mutual interest in the task of buttoning down the burgeoning cable business. Along with formal presentations made in front of the entire assembly by top CableData officials, this year's seminar included smaller workshops for customers to discuss hands-on problems. Topics covered in the workshops were addressability, hardware, release 6.7, release 8.0, Pay 80, and CableData's newest business application systems (all to be discussed in this issue of Via Cable).

A major announcement concerned CableData's future way of doing business. With the release of 8.0, slated for late 1983/early 1984, customers will have the ability to buy or lease any component of CableData's service, either as a total package, or with each component exclusive of the other:

- Hardware
- Hardware Maintenance
- DDP Software
- Software Maintenance & Future Releases
- Customer Services Support
- Statement Printing & Inserting

The intent behind CableData's future direction is to give operators an even more flexible way of controlling and managing their ever-changing businesses. A complete report will appear in the January issue of Via Cable.

It is apparent from this year's meeting, as well as from the general comments made by participating customers, the future holds a definite challenge to everyone in the increasingly complex cable game. How to take advantage of all the newest technologies available without losing control of your business . . . and your checkbook . . . in order to break revenue barriers is the big question. While CableData doesn't purport to have all the answers, it's certainly paving the way on behalf of its customers in the arena of both software and hardware. And in the words of one on-line customer commenting on this year's On-Line Users Meeting, "Anyone who is on-line with CableData cannot afford to miss these meetings. In fact, I suggest they include the event in their budgets for next year." Thanks, Eric Kronen, Viacom, RonKonKoma, NY, for your vote of confidence!



1982 Participants

MIKE FRANKS, Buford Television, Tyler TX
ROBERT McMICHAEL, Buford Television, Tyler, TX
TIM TRENARY, Capital Cities Cable, Bloomfield Hills, MI
PHIL SCHLEAGER, United Cable, Denver, CO
STEVE JOHNSON, US Cable, Hackensack, NJ
SANDY CASE, United Cable, Hackensack, NJ
CALVIN ROSE, Cox Cable, Omaha, NB
MIKE BRENNAN, Cox Cable Omaha, NB
ERNEST STATEN, Tulsa Cable Tulsa, OK
DAVE WAREHIME, Telecable Auburn, AL
ADRIAN COX, Summit Cable, Winston-Salem, NC
HOLLIS SCOTT, Telecable Corp Norfolk, VA
JAMIE JONES, Telecable Norfolk, VA
SONYA MOORE, Tulsa Cable, Tulsa OK
RON RIERSON, Tulsa Cable, Tulsa OK
SCOTT HANKINSON, United Cable Englewood, CO
ZUDY ZIMMETT, Cablescope, Buffalo, NY
TERRY WOLFE, United Cable, Denver, CO
KRIS ROSE, UA COLUMBIA, San Antonio, TX
WAYNE GAMBLIN, UA Columbia, San Antonio, TX
RHONDA CHRISTIANSON, Rockford Cablevision, Rockford, IL
MAUREEN GLEASON, American Video Corp. Pompano Bch., FL
CHARMAIN TYLER, Daniels & Assoc., Denver, CO
WILLIAM KOTTA, Viacom, San Francisco CA
LEON CAULKINS, Viacom, San Francisco, CA
BILL MOSELEY, Cablesystems Pacific, Portland OR
DALE MOSES, Cablesystems Pacific, Portland OR
EUGENIA GIOLES, Group W, Manhattan NY
TOM RAYE, S. Conn Cablevision, Bridgeport, CT
DOUG EISELE, Columbia Satellite Systems, Houston, TX
EARL LANGENBERG, UA Columbia, San Angelo, TX
RON MURRAY, Cox Cable, Oklahoma City, OK
LOREN HUMES, Hayward Cable, Hayward, CA
TOM REINHARD, Heritage Communications, Des Moines IA
JO LEONARD, Heritage Communications, Des Moines, IA
ART HUTZLER, Heritage Communications, Des Moines, IA
PAT KING, UA Columbia, Oakland, NJ
JOE KOPEL, Group W New York, NY
ERIC KRONEN, Viacom, RonKonKoma, NY
BARBARA McWHORTER, UA Columbia, San Angelo, TX
BRIAN McCARRON, United Cable, Denver, CO
RICHARD GOLDMAN, United Cable, Denver, CO
DON DAVIS, Columbia Cable Rosenburg, TX
RICK CLUTHE, Suburban Cablevision, E. Orange, NJ
ERIK BEST, GE Cablevision, Schenectady, NY
MIKE ANZIANO, United Cable, Englewood, CO
TOM MILLITZER, Group W, New York, NY
BOB BOTELOCK, Viacom, Dublin, CA
PAUL SHELEG, Viacom, Dublin, CA
R. TODD NEWSON, Warner Amex, New York, NY
FRAN PARKEY, Storer Cable, Fairfield, CA
JOHN GILL, Indiana Cablevision, Mishawaka, IN

KEN WARNER, United Cable, Denver, CO
JOE JOHNSON, Rollins Cablevision, Newcastle, DE
JOE CLINE, Rollins Cablevision, Newcastle, DE
TOMMY MAUGHON, Cox Cable, Atlanta, GA
ANGELA BEAUBIEN, CUC Ltd., Scarborough, Ontario
HEATHER GORDON, CUC Ltd., Scarborough, Ontario
GERMAIN GASTON, CUC Ltd., Scarborough, Ontario
KATHY ALLEN, New York Times Cable, Audubon, NY
GAIL KIRKPATRICK, ATC, Englewood, CO
GARY OLMSTEAD, ATC, Englewood, CO
JOANNE JOVANEC, ATC, Englewood, CO
CAROLYN DAVENPORT, Group W, New York, NY
DICK JOHNSON, ATC, Englewood, CO
LEN WHITE, Summit Cable
JIM PIRNER, Telecable
MIKE MAULDIN, Cable America
TOM LAMB, US Cable

Left to Right Mike Neal, Rick Cluthe, Liz Jones, Ron Syerly & Jo Leonard

The Next Step — Release 6.7

Susie Mathews

Susie Mathews, DDP Software Director, led the discussion on CableData's current release-in-progress, 6.7, and highlighted the software features operators could expect to see soon:

- All services tracked by "outlet"
- Enhancement of Special Events
- Electronic Funds Transfer System
- Expanded Reporting

SERVICES BY OUTLET

In 1981, Release 6.5 introduced our addressable interface based on the premise that all converters in a house would have the same services. However, the sophistication of the cable industry is changing and with addressability, cable systems can sell different services to individual TV sets within the same household. Consequently, each TV set or "outlet" could have its own unique set of services. Release 6.7 will accommodate this marketing direction by providing accounting and authorization of services per each separate outlet.

Operators will be able to pinpoint each outlet's location in the house and identify all authorized services specific to it. Rather than take an order for the entire household, operators will have the capability of taking an order for an individual outlet(s). All package codes existant in DDP 6.5 will remain the same, while tasks will be calculated per outlet. Charging may be done in two ways: 1) one charge for all services or 2) a break-down of charges for services per outlet.

PAY-PER-VIEW

Susie Mathews explained that Release 6.5 contained a preliminary special events module which was designed to accommodate the relatively new area of addressable pay-per-view-events. Since 1981, pay-per-view, as a marketing technique, has expanded. DDP users are now preparing to sell multiple events and need the ability to sell and account for different events to different outlets. Release 6.7 will provide authorization and accountability for up to 64 simultaneous special events. It will store data for 999 past and future events. Release 6.7 will also provide the capability of billing for special events per separate outlet.

ELECTRONIC FUNDS TRANSFER

In 1981, CableData was still experimenting with the bank draft scheme and learning about electronic funds transfer. With Release 6.7, Electronic Funds Transfer System (EFTS) will be a reality. The system will be parameterized by each clearing house (bank) and CableData will write a package of accommodating software for each bank. A magnetic tape or transmit file will be sent from CableData to each clearing house involved for all charging. Each "run" will create two trans-

actions for each EFTS customer: 1) a debit transaction for a customer's bank account, and 2) a credit transaction for a customer's cable account.

Cable systems will receive full Summary Reports with revenues reported by any of the following:

- Management area
- Franchise Tax area
- Customer Bank
- Zip Code

On-line customers interested in EFTS should contact their banks and CableData to begin establishing parameters. The program is 100% design-completed, coded, and in the certification process. We're ready!

Art Hutzler, Heritage Communications & Marla Warner, CableData

EXPANDED REPORTING SCHEME

"In 1981," stated Susie Mathews, "we knew reporting schemes would have to change to handle multiple pay services. Cable marketing strategies were becoming increasingly sophisticated and operators needed the ability to track trends at tier level. DDP, while keeping pay services accountable, could not reflect exact upgrade/downgrade movement to identify marketing trends." Mathews presented a solution to this problem with Release 6.7. "Reporting will allow accurate representation of combo code breakdowns and movement between tiers."

For example, with the old reporting scheme, a customer who had HBO and Showtime would have a certain combo code. When that same customer added the Movie Channel, the old combo code would be dropped and a new one added. When it came to reporting, this movement was reflected as an inaccurate picture of an HBO/Showtime downgrade. With Release 6.7, the net reporting result would be: HBO/Showtime maintained; Movie Channel upgraded. This new reporting scheme will be prevalent in the following:

- Status Summary Report
- Sales Commission Report
- Subscriber Activity Report
- WIP Select Report
- House. Customer Select

Mike Franks & Bob McMichael, Buford Television

STATUS OF 6.7

According to Susie Mathews, work is heavily underway for release 6.7. The design for "services by outlet" is 100% complete with coding 30% complete. The EFT system is 100% designed, coded, and currently in certification. The design for the "special events" feature is 100% complete and the "expanded reporting" scheme is now beginning

"A chicken in every pot, a car in every garage, and Release 8.0 in 1982."

Tim Millitzer, Group W

Last year CableData was firmly intent on making Release 8.0 its next major project. However, as time progressed, other problem subjects reared their heads making further progression impossible without solving the immediate problems. Addressability, pay-per-view, multiple outlets, and combo reporting all demanded CableData's attention first. With Release 6.7 neatly tucked away on these subjects, CableData can forge ahead with Release 8.0. A sneak preview into five major areas reveals preliminary designs for:

- New file design
- Automatic Transfers
- First and Last Bills
- On-site Charging
- Accounting Reports

These items have been mentioned in varying degrees of interest and commitment over the past few years, but with the rapidly changing and growing problems in the cable industry they have been tough to get to. However, now is the time and as we prepare for Release 8.0, CableData has an experienced programming team in place, four certifiers, and a documentation team dedicated to DDP. Look for results at the next On-Line Users Meeting in 1983!

Pay 80

The Answer to Tiered Service

Frank Delfer

The proliferation of multiple tiers, while increasing revenue, subscribers, and the marketability of cable television, has also created new problems for most cable operators. How to take speedy orders from a customer who wants diversified tiers; how to financially account for these multiple services once rendered; and how to fully assess your marketing efforts with an accurate view of subscriber trends all set hurdles in the path of effective control. Pay 80, a promise in 1981 and a product in 1982, addresses this three-fold problem.

Frank Delfer, Cable 80 Software Director, led the discussion on Pay 80 whose primary objects are:

- To provide support for DDP
- To provide expanded reporting capabilities
- To make payment allocation easily identifiable and manageable
- To expand adjustment capabilities
- To further itemize billing

Specifically, Pay 80 will provide extensive reports on suppliers and tiers, life studies and statistical data, and consolidated MSO summaries. With Cable 80, operators have a limited capacity for adjustments and payment application — Pay 80 provides the capacity for entering and recording over 2,000 adjustment reasons and three methods of applying payments.

According to Delfer, it is for accounting and reporting purposes that Pay 80 really stands out as a benefit to cable operators. Although only one entry is needed to input services into the system, Pay 80 extracts all the codes and provides a complete breakdown and analysis of all services rendered. Unlike Cable 80 which provides a limit of five "companies" in which to lump services, Pay 80 provides 60 "reporting centers." It is from these reporting centers that Pay 80 derives all of its expansive reporting capabilities.

Currently, Cable 80 applies money collected to oldest money due first, and then to companies based on established priorities. Pay 80 expands the operators ability to designate "who gets what when." For example, you want HBO to be first on your payment list. Then, you want what's left to go to Showtime as a second priority, and last, you want what's left to be equally split between Galavision and Bravo, each a third priority.

Also, explains, Delfer, since Pay 80 takes you from five companies to 60 reporting centers, the voluminous

amount of report possibilities cannot be contained on one page. Therefore, each report is parameterized by each customer and the report can show exactly what the customer specifies: on any page, in any order, by individual reporting centers, or by groups of reporting centers.

Pay 80 can "lump" all services into one line with one amount on the statement and yet pull out complete, itemized breakdowns for reporting purposes. Also, the statements produced by Pay 80 will include options for more detail on the lower part of the statement.

When will Pay 80 be ready for implementation? The first corp to go live is scheduled for November, 1982.

Germain Gaston & Heather Gordon, CUC Ltd.

CAPS

Larry Shaw, CableData

The newest member of CableData's software family is a new business applications package which includes:

- General ledger
- Accounts Payable
- Fixed Assets
- File Management

In 1981, CableData was reviewing the needs of our on-line users and decided that the Tandem computer could handle other software programs besides DDP in order to make it as cost-effective as possible for a cable system. Thus, a new approach was taken to ancillary software with the organization of a new department, additional human resources, and a plan for full documentation. Under the leadership of Larry Shaw, Business Systems Software Director, the department introduced CAPS, which is now fully ready for demonstration and installation.

Speaking before the assembly, Shaw explained that CAPS was an accounting package specifically designed for the user: all transactions can be edited by the user; it will process new year transactions while closing the prior year; the system provides a complete screen display of all transaction and master files; and it is integrated for use with DDP. Other features include:

- Multiple Corporation Division Processing
- Extensive Security Access defined by the user
- All accounting and EDP Controls

CAPS can be utilized by all On Line Exclusive, Shared, and Mini customers. For all you accounting buffs who want more detailed information on CableData's new CAPS package, please contact your marketing representative.

Decreased Turnaround Times

David R. Williams, CableData

David R. Williams, Vice President of Operations, took the podium to discuss factory turnaround times. "Last year, our turnaround was running above 60 hours. Since then, we have taken many steps to reduce turnaround, with the end result now being an average of 44 hours each month-end."

According to Williams, the addition of new equipment significantly contributed to CableData's capability to reduce turnaround times. Two Honeywell main-frame computers were

added, bringing the total daily processing capacity to 2,000,000 subscribers per day; two new laser printers contribute to 1,500,000 statements printed per day; and three rotary inserters handle 1,500,000 bills per day. CableData's plans for 1983 include maintaining turnaround goals by adding two more Honeywell mainframes, new microfiche recorders, and by conducting an inserting study to determine and accommodate our customers' needs more fully. Related to the inserting process, Williams also added that new presses were installed in the Printing Department to handle the growing demand for CableData's insert printing services.

John Gill, Indiana Cablevision & Tom Lamb, US Cable

Addressability

Susie Mathews led the discussion on CableData's experiences with addressability. Last year, CableData introduced Release 6.5 which married addressable converters to the billing system for streamlined operations. Our goal was to make addressability a profitable way of doing business for cable operators by taking an integrated systems approach, with the business office as the hub of activity and control. Since then, we've learned a great deal about the boxes available and have discovered that in each case, converters were designed as hardware components that did not necessarily take the "total business" approach. Consequently, DDP from the business angle and addressable converters from the hardware angle had a lot to learn about each other.

As an example, DDP was designed to be the master data base because it controls your business and produces the subscriber bill. However, a separate data base was required by converter manufacturers (Jerrold, Oak, Zenith, & Tocom) in order to constantly re-authorize their boxes. With two data bases, there was always a chance for the two systems to be out of sync. To offer a solution, DDP now has an option whereby the operator can re-establish the entire remote data base of the boxes.

Another example is DDP was designed to have the box respond to its commands immediately and implement changes while the customer or technician was on the phone. In actuality, Jerrold has a 30-second response, Oak a 30-60 second response, and both Zenith and Tocom must be tuned to the control channel for any response.

Also, DDP's collections run was designed to automatically de-authorize addressable boxes for non-pay disconnects — the idea being to save the operator time and money on disconnect day. Again, the boxes were designed to perform this function but without regard to the effects on the business office. They respond to such commands by scrambling pay channels and giving no immediate explanation to customers, other than a snowy screen. On disconnect day, the cable office might experience as many as 2,000 phone calls. We have since made the automatic disconnect function optional, but the question remains, are addressable converters an integral part of the business, or is the business subservient to the addressable converter?

While CableData will continue to enhance addressable software for its on-line customers using conventional addressable boxes, we can't help but think there's a better way to do this whole business of addressability.

Angela Beaubien, CUC, Ltd.

CableData DDP Interface Customers

	Interface Installation	Boxes
BLONDER-TONGUE		
Wometco	August '81	35,000
OAK		
Culver City, CA	November, '81	11,000
Omaha, NB	March, '82	45,000
JERROLD		
West Seneca, NY	April, '82	18,000
Quincy, MA	August, '82	10,000
Chattanooga, TN	August, '82	2,000
Waukegan, IL	August, '82	2,000
ZENITH		
Portland, OR	April, '82	14,000
Lexington, KY	August, '82	24,000
Springfield, MO	July, '82	12,000
Arlington, TX	July, '82	17,000
Martinez, CA	September, '82	10,000
TOCOM		
Baton Rouge, LA	July, '82	5,000
INDAX		
Omaha, NB	TEST	250

Kathy Allen, New York Times Cable

Judy Zirnmett, Cablescope

HTU MANUFACTURING

Bob Mathews, CableData

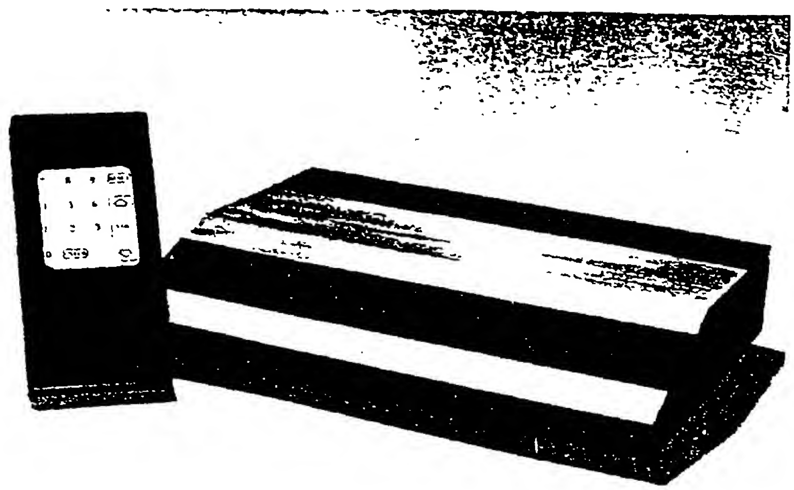
Bob Mathews announced full-speed-ahead manufacturing plans for CableData's one-way addressable converter, the HTU, at the On-Line Users Meeting. A new 80,000 square foot building has been constructed in the suburbs of Sacramento, California and specifically designed equipment has been installed to facilitate the manufacturing process. It is projected that once in full swing, the HTU Manufacturing Department will produce 150,000 units per month employing three work-shifts. Strong emphasis will be placed on quality control with 100% inspection of each component.

Prior to full scale production slated for the latter quarter of 1983, the HTU will undergo rigorous testing and necessary revision. The first model of which 20 are complete, will be field tested in Tulsa, Oklahoma in November, 1982, followed by another possible generation of HTU's installed in Des Moines, Iowa at Heritage Communications in December-January. Factory start-up with 2,000 per month saleable units will commence in February, 1983, with an anticipatory 50,000 units produced per month by May.

Technical features of the HTU include:

- 54 channel tuner
- Baseband design
- Remote Unit
  - Volume up/down
  - Mute
  - TV on/off
- 16 bit computer
- 16K video memory
- 1K working memory
- 1/4K non-volital memory
- 4,000,000 bits/second data slicer

Proposed sale price of the unit is $197.00.



A Commitment to Hardware Development

Mike Neal, Hardware Director

CableData's highest profile has always come from the software angle and not necessarily from hardware achievements. However, a large part of our business has always been hardware development. From the customer's perspective, CableData appears to be a hardware clearing house that receives equipment from a major manufacturer and then simply resells it to its cable customers at a considerable profit. And while we do realize a profit in the normal course of doing business in the hardware world, behind the scenes a major portion of that profit goes back into research and development for that same equipment. Testing, assembling, and modifying hardware to match our operating software is the key to the system's performance at the customer's site.

What you buy from CableData is not necessarily what you would get directly from the manufacturer. As an example, the Zentec terminals have undergone significant modifications by CableData since coming off the assembly line from Zentec: the keyboard has been adapted to match our software procedures, a special chip has been designed to DDP specifications, buffered ports have been modified to perform printing tasks significantly better, and constant staging, testing, and scrutinizing the terminal's interaction with Tandem and DDP have resulted in increased overall performance.

Anyone can buy hardware components, but putting them all together for the optimum, integrated computer system takes research and development, which is what you buy from CableData — a commitment to get the best hardware results.

Since 1980, when CableData implemented Tandem computers, it placed both feet firmly into the hardware world and gained customer visibility. Since then, we have been learning and moving forward at a rapid pace . . . a pace that was illustrated by National Hardware Support Director, Mike Neal, at this year's On-Line Users Meeting.

The Hardware Support Philosophy

According to Mike Neal speaking before the assembly in Las Vegas, "CableData has a firm commitment to help keep your computers up and running. We need to install and repair hardware without regard to the clock; we need to keep parts of your business going, even if the Tandem is in trouble. In short, we are committed to making our field engineering and hardware support groups the highest caliber of individuals at CableData."

To accommodate the support philosophy, Neal explained the new hardware organization implemented in 1982. The National Hardware Support Department was organized to provide customers and CableData regions with 24 hour coverage. Each shift consists of a hardware team member, system software member, and an application software member. Together, they work to isolate hardware from software problems. This consolidated technical expertise was placed on the front lines.

Regional hardware groups have also been elevated: more engineers on staff and a higher caliber of personnel hired. Formal training classes were established and executed with the intention of screening out the weaker field engineers at the onset. A "tech memo" scheme was implemented to redistribute new hardware information into the field, to share solutions to difficult problems for easy identification at the next "fix," and to document precise. site maintenance functions. Also, an aggressive preventive maintenance policy has been established that requires the field engineers to perform some PM during each site visit. Neal stressed the importance of PM and encouraged customers to alert him when this was not being done. A "site log" should appear at each Tandem site that gives customers a record of CableData's performance on their machines.

Tandem Manufacturing

On behalf of its on-line customers. CableData keeps close contact with Tandem, Inc. to provide constant feedback about needed product improvements, as well as to be made aware of all the latest developments at Tandem. As ten OEM's comprise 25% of Tandem's total business, an active Tandem OEM Users Group has been established, of which CableData's executive vice-president Dave Barnes is chairman

Spare Parts Inventory

CableData has invested two million dollars in spare parts, housed at the regional offices, to provide prompt repair and replacement of customer hardware when needed. All spare parts inventory previously housed at corporate headquarters in Sacramento has been moved to Atlanta to facilitate timely air shipping to customer sites.

Hardware Development

- Since 1980, when CableData first began testing and assembling system components in-house, it has drastically reduced the entire online system installation process. In 1980, it took us 30 days to install a Tandem in Fairfield, NJ — today, one of our recent installations took 4 hours.
- CableData now manufactures all computer cables in-house. This gives us the ability for quality control and the opportunity to improve on vendor-design weaknesses. It also allows CableData to accommodate special hardware configurations at a reduced cost to customers.
- By staging and testing every CRT shipped to CableData from Zentec, CableData has significantly reduced dead-on-arrival CRT's at the system site.
- Also, we discovered the difference in impact on printing jobs performed by CRTs with 4K and 16K buffers. The 16K buffered CRT proved to be superior and CableData is currently working on modification of all existing CRTs.
- The Century drive was improved to more accurately report errors by modifying the wiring. Also, CableData installed the Century drive "fault latch" which designates what memory board is affected when a drive defaults.
- CableData is currently in the process of constructing a new product model of the On/Line Shared System. The goal is to improve response times for all shared customers.
- We are also researching the cable system's use of existing microwave links for DDP/data transmissions in an effort to reduce telephone line costs. Also, CableData is continuing development on a multidrop scheme which will place multiplexed DDP data on a single, leased telephone line.

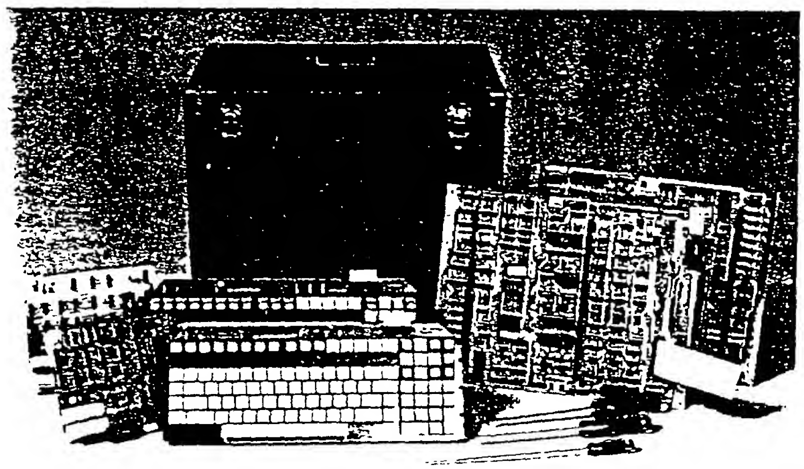
Hardware Workshop

Innovative New Products

Among all the hardware modifications developed by CableData to improve hardware performance, perhaps the most innovative new hardware product designed by CableData is the MTU, Multiple Terminal Unit, which was unveiled at the Users Meeting. The product is a multiple-screen device which allows the operator to glance at three simultaneous data screens for immediate assessment and decision making. It is particularly geared towards accommodating the function of the cable system dispatcher, but can be adapted to any cable system function. Exclusively designed and manufactured by CableData for its on-line customers, the MTU is now available. Please contact the Marketing Department for more information and prices.

Multiple Terminal Unit

Another new item of interest is a CRT Repair Kit which provides enough spare parts at the system site to replenish two complete terminals. All components are individually packaged for mailing convenience and come complete with an easy-to-understand manual. The repair kit was designed to eliminate the downtime between CRT failure and repair by a CableData regional office. Price: $2,400.



CRT Repair Kit

A Formal Procedure for Software Assistance

It is ironic that CableData is recognized as the software leader in the cable industry with 55% of the market, while at the same time tagged as being inflexible. The two are truly incongruous. In order for a software company to survive and get this market penetration, it must be flexible enough to accommodate a wide variety of users and needs. And CableData has certainly survived admirably well. This was possible because of three reasons. First, CableData devoted itself exclusively to one industry — cable television. Second, it studied and completely analyzed this industry and its inherent problems. And last, using its data processing expertise CableData wrote software that solved those problems in a very parameterized fashion.

The reason for CableData's inflexible reputation is not due to its rigid software but because there has been a perpetual misunderstanding about how CableData handles software requests from customers. Our idea is not to simply respond to what someone wants, but to thoroughly understand the problem before embarking upon an effective software change that will, indeed, solve that problem. And because we have never established a formal method of receiving customer input and a follow-up to those customers the way we reach new software enhancements has always been somewhat of a mystery. We'd like to change that.

Eric Jungemann, Director of National Software Support, introduced a new, formal procedure for software assistance at the On-Line Users

Eric Jungemann; Director, Software Support

Meeting. Cable systems are now required to formally complete and submit a special form to CableData for action on all software assistance requests. This form alerts CableData to two types of requests:

- A fix on a software bug
- A request for software enhancement

The forms should be directed to the Regional Manager in your area who in turn will contact you to fully analyze the situation before forwarding to CableData's corporate office.

In the case of a software bug, it should be addressed via this form and forwarded to the region. However, in an emergency, the bug can be reported via the phone and the region will prepare and forward the assistance request. CableData will deal with all bugs as quickly as possible.

In the case of enhancement requests, the form is to be directed to the Region Manager who will analyze the request and reach a thorough understanding of the problem attempted to be solved. The request will then be forwarded to the Sr. Programming Executive who will review all requests on a monthly basis. Often times, because the software is so highly parameterized, the solution is already within the software simply by changing the parameters of a particular program. Enhancements that cannot be achieved through parameter changes will be considered according to the perceived need of the cable system making the request and upon the number of other on-line customers voicing the same concerns.

In all cases, CableData will attempt to accommodate its users in every way possible and will provide a follow-up on all requests submitted.

"Our software policy," explains Jungemann, "is one of providing a very parameterized software package to a wide variety of users in a single industry — cable television. We cannot be *everything* to everyone, but our programs will satisfy 100% of what a system operator needs to run his business efficiently and 90% of what he wants."

Adds Jungemann, "Our commitment and mission is to keep pace with your business from the software side. In 1981, we had a staff of 14; today, National Software Support employs 28 individuals to handle your software needs."

Customers who have not received a supply of Software Assistance Request forms should contact their respective CableData regional offices.

Left to Right: Jim Pinner & Len White, Summit Cable

Left to Right: Earl Langenburg, Wayne Gamblin & Barbara McWhorter, UA Columbia

The Business of Sharing
On/Line Shared System

Maggie Wilderotter, Marketing Manager, discussed the On/Line Shared System product and some of the slow response times larger cable systems have been experiencing. Wilderotter informed the assembly that CableData is currently in the process of researching new hardware configurations for the product in an effort to improve response times. However, it was noted that the definition of good response time varies from customer to customer. Don Davis of Columbia Cable, Houston, TX, illustrated the difference of management styles and the effect of response time. "We are not overly concerned with slow response because we make it a point to socialize and relate to customers while on the phone; it's part of our marketing strategy. We stay away from limiting conversations to 2-3 minutes and shuffling customers through as fast as possible. For our business, computer response time is not a problem." However, most customers agreed that when it came to taking last minute pay-per-view orders, the responsiveness of the computer was crucial.

On/Line Shared Workshop

Don Davis, Columbia Cable

Wilderotter announced a new approach to the On/Line Shared System by introducing a concept called "partioning" which gives operators total control of their processing activities while remaining in a shared environment.

With the current On/Line Shared System, customers literally share CPU's and disk drives — CableData makes the determination as to which work tasks are run on which CPU with regard to type of function. The entire workload is balanced for the best processing results. However, each customer's use of the CPU affects other customers sharing the same CPU. So if there are several large cable systems performing the same tasks simultaneously, they are both affected

The partioned system will allow a cable system to rent one of eight CPU's, housed in a common cabinet. That CPU and its corresponding disk drive(s) are for the exclusive use of that customer. His data processing activity affects only his operation since that CPU is not shared by other customers. The partioned system gives operators more control of their data processing tasks and response times, while continuing to alleviate the computer operation responsibility from the cable office.

"CableData," concluded Wilderotter, "made a data processing commitment to you when it introduced the On/Line Shared System. We will dig in, analyze, and work with each of you to improve the shared system and computer response times."

Rick Cluthe, Suburban Cable

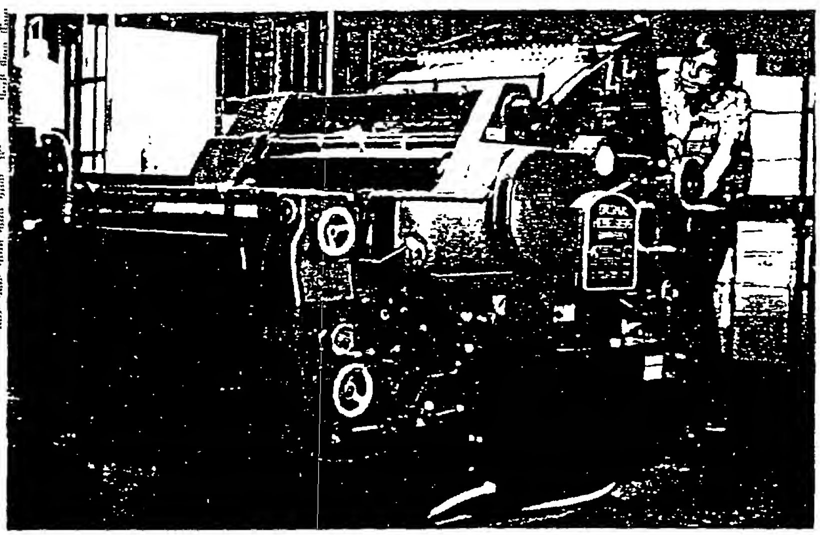
New Marketing Manager Appointed

Maggie Wilderotter

Maggie Wilderotter has been promoted to the position of Marketing Manager. In her new capacity, Wilderotter will be responsible for CableData's convention activity, advertising, and marketing/sales coordination. Wilderotter joined CableData in January, 1980 as the Manager of the Accounting Department and in 1982 was appointed as Manager, Regional Support where she served as the communication link between corporate and regional offices.

Prior to CableData, Wilderotter was with the Arizona Bank in Phoenix and with Gorman Whitney Development Co. in Sacramento. She holds a BA degree in Business Administration from Holy Cross College, Worcester, MA.

In-House Printing Increases Dramatically



Heidelberg KORS, CableData's latest printing facility addition, Sam Morefield, Printing Supervisor

Since our announcement in the July issue of Via Cable about our in-house insert printing capabilities, we have had a surge of printing orders. According to Kal Hartig, Printing Manager, "Our insert workload has increased by 15-20%. Storer Cable, alone, submitted a printing request for 1.1 million inserts for the following month." To accommodate both customer and in-house printing needs, a new press (direct from Germany) has been included to the print shop inventory that will double our capacity for anything from a 1-color to 4-color printing job. Also, three full shifts are employed when necessary to meet deadlines.

"It is our intention," offers Hartig, "to provide printing at less cost and at a quality equal to or better than any other outside printer." Systems interested in having CableData print their inserts should contact their regional offices for more details. Questions regarding more complex printing jobs should be directed to Terry Williams of the Printing Department (916) 638-3175 who will help you decide on format, paper, and ink colors.

Kalman Hartig

Training in November

ATLANTA REGION

Terminal 1500 .... Nov. 10-12
Management Seminar .. Nov. 15-16
DDP, Order Entry/Dispatch ..... Nov. 17-23
Terminal 1500 .... Nov. 22-24

INDIANAPOLIS REGION

Accounting Seminar ...... Nov. 22
DDP, Order Entry/Dispatch .. Nov. 22-Dec. 1
DDP, Director File ...... Dec. 1-3
DDP, Collections/ Reporters .... Dec. 7-10

PHILADELPHIA REGION

DDP, Order Entry/Dispatch .. Nov. 16-17
DDP, Director File .... Nov. 18-19
DDP, Collections/ Reports .... Nov. 29-Dec. 1

SACRAMENTO REGION

DDP, Collections/ Reports .... Nov. 9-10
DDP, Order Entry/Dispatch ..... Nov. 15-16
DDP, Director File .... Nov. 18-19
Terminal 1500 .... Nov. 22-24

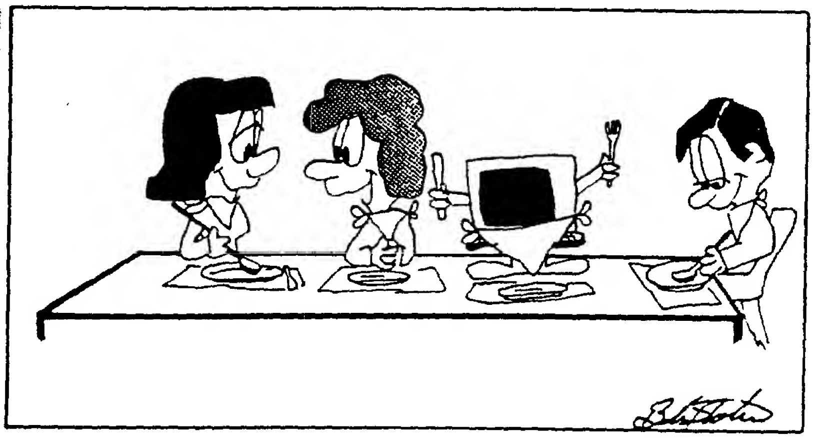
DALLAS REGION

Please check with regional office.

SACRAMENTO CORPORATE

No Management Seminar scheduled for November.

HAPPY THANKSGIVING!



"It's always interesting when Roger invites his friends from work home for dinner."

NEW CUSTOMERS

On/Line

TCI, Salt Lake City, UT
TCI, Bountiful, UT
TCI, West Valley, UT
EAST CONNECTICUT CATV, New London, CT
KINGWOOD CATV, Kingwood, TX
FLORIDA SATELLITE NETWORK, Zephyrhills, FL
CABLENET, Oakville, Ontario

Cable 80/Terminal 1500

CABLE HOLDINGS, Luling, LA
STORER, Glendale, AZ
GROUP W, Wayne, MI
CONTEMPORARY CABLE, New Rochelle, NY

Turnaround Times

	Reports	Statements
October, 1982	33.4 hrs.	47.4
September	32.2	47.8
August	35.1	55.2
July	41.0	57.8
June	34.8	60.8
May	35.2	52.4

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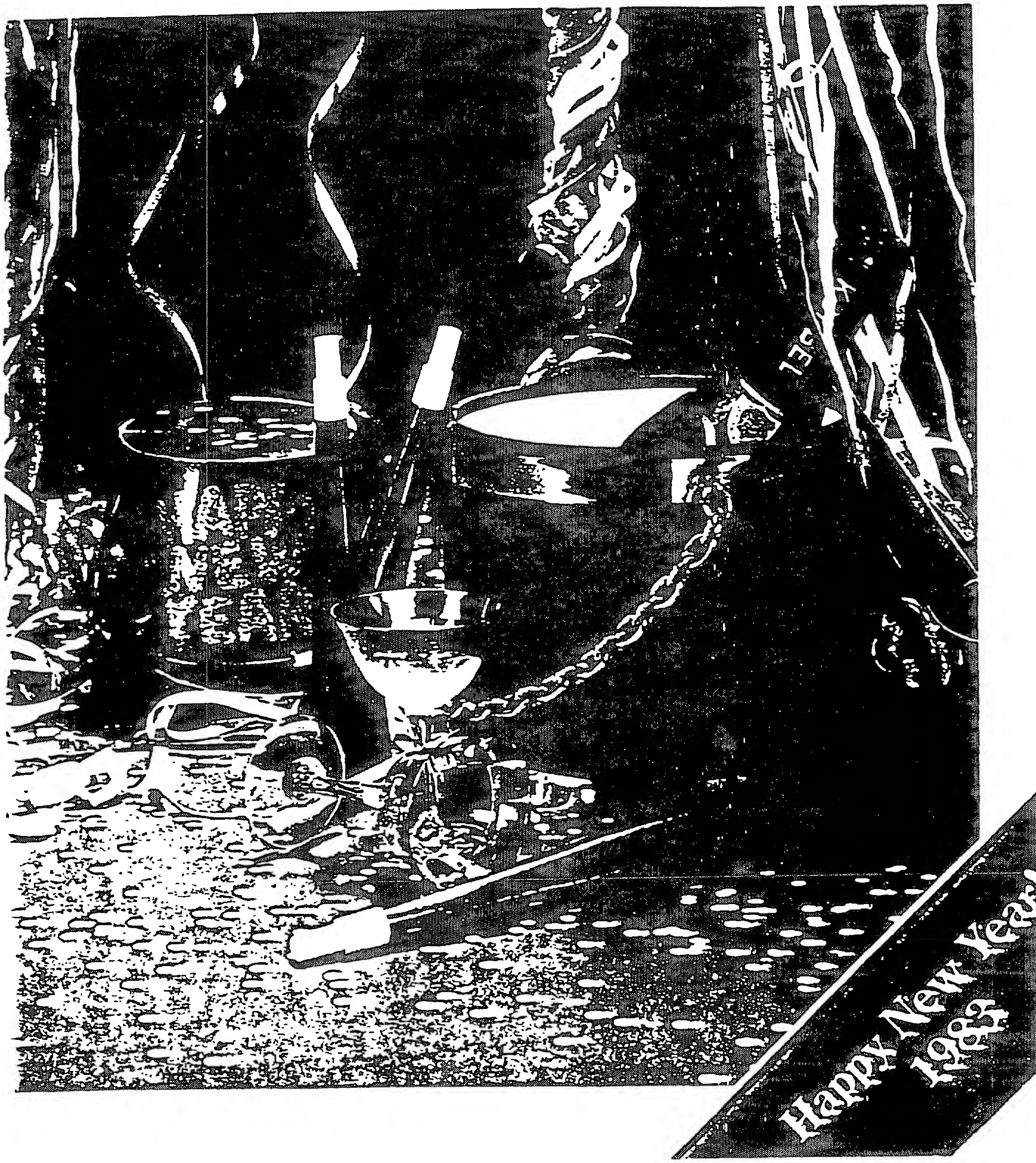


Editorial

1982 Was A Sleeper

Optimism reigned supreme at the start of 1982 with most of us projecting higher subscriber-generated revenues, more advertising support, and newer technologies in place. In reality, 1982 proved to be rather docile — a lot of talk but little action. While according to analysts the industry maintained a consistent momentum throughout 1982, which in itself was no small feat considering the economic gloom prevalent across the country, the cable industry nonetheless didn't launch the spectacular revenue returns predicted at the onset of the year. Whether this is due to the fact that cable might not be as recession-proof as we thought, or that the flurry of franchising demanded most of the attention of operators, or, still, that programming has a far piece to go before attracting and retaining customers, one fact remains pretty obvious. It's time to regroup, replan, and attack anew. It's time to make cable television an institution.

The novelty of cable is fading; this is apparent as newer franchises have to offer more and more in their proposals to secure a grant. It's no longer adequate to provide better reception, more entertainment choices, and more information. We're all tangled up (operators, government agencies, and subscribers alike) in expecting and delivering all those promised technologies that have surrounded cable almost from the very beginning. In shooting for blue skies, I almost think we've forgotten the basics: good service, quality programming (as opposed to quantity), and a realistic dollar amount consumers will pay.

Network television never had it so hard! Virtually competition-free for three decades, and free, it also started out as a novelty. However, as it continued to provide entertainment and information which bound the nation's coasts and everything in between together (never mind that the consumer had only three channels), it weathered the novelty-era and firmly entrenched itself as an institution. It was there first and for cable to surpass it, cable has to be better.

Long a threat to the networks, cable has managed to fragment the audience but it's still in a race to provide programming that is uniquely "cable" and to capture the loyalty of subscribers. I equate the position of cable television to that of my son's home video-game set-up. This Christmas brought him no less than ten new game cartridges, making his total library about 25. From so many games to choose from, the twelve days after Christmas were rather fickle as he went from one game to another, making Spiderman climb, Donkey Kong fall, Pac Man gobble, and Frogger sweat it out. But after beating his choices to death, he eventually settled down to three or four of his favorites — the rest, no doubt, will collect dust, as will my wallet.

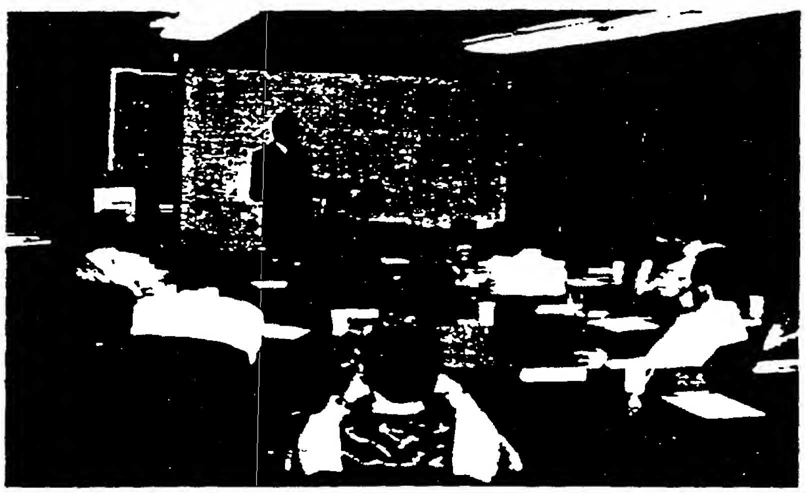
Programming for 1983 might bring some welcome, and necessary changes, that will elevate cable to higher creative levels and make it attractive and lucrative for both advertisers and consumers. In fact, a word of advice to operators came from a recent issue of "Advertising Age" where editorial stressed the importance of programming in luring subscribers in big enough numbers to subsequently lure major advertisers. Advertising support will come, offered the article, when cable operators package their services to appeal to dedicated audiences. As one supporting illustration, Ted Turner's WTBS has managed to loosen advertising strings in 1982 because it has a committed following of subscribers. In fact, along with HBO, WTBS seems to be a "cable" institution. What is really frightening, and downright offensive, to cable as a total medium is an image of second-rate or duplicated programs. A remark made on one of the network programs, "Entertainment Tonight," was enough to curl an operator's hair. In reviewing a recently-released movie, the critic spoke of the production's limitations and gave it a rating of "three" on a scale of one to ten. He summarized his negative review by saying "this one's definitely cable TV material." Enough already! (Let's hope none of us opt to show Peter Sellers' new Pink Panther movie on cable and fulfill this prophecy.)

From the business angle, operators will have to make sure all the various components (software, hardware, the headend, and subscribers' homes) are integrated for maximum profitability. Control will become more important than ever before as operators repackage and remarket their services in an

attempt to open the revenue flood-gates. Also, security will be a key word in an attempt to recoup the estimated 2.4 million dollars lost each year to pirates and computer wizards, as will educating the public and the government as to what happens to the quality of cable services when the system is deprived of its full revenue potential. Just as government regulates and monitors cable television, it must support and enforce those laws that protect its rights. In short, as CableData's president Bob Mathews remarked, "the industry must go from 'passive' to 'active' in order to survive the 80's."

What's the prediction for 1983? I think most operators agree it's back to basics with a heavy focus on customer services and remarketing. The wild optimism and blue sky promises of early 1982 have calmed down considerably — in their wake is a more realistic and steadfast approach to facing the challenges of the 80's. Also, with most of the major areas of the United States already past the franchising process, more attention will be given to construction, delivery, and consistency. The game has actually just begun. It's time, as it was in 1975 when HBO hurled us from the brinks of mediocrity, to introduce something new . . . something that will push us closer towards establishing cable as an institution.

Group W Officials Visit CableData in Sacramento



Bob Mathews, President of CableData, addresses Group W executives in Sacramento.

Nine members of Group W's executive team came to Sacramento on December 15, 1982 to become more familiar with CableData on a grass-roots level and to learn about its on-line services in depth. Bob Mathews opened the one-day meeting by discussing the industry's survival tactics for the 1980's. To get over the revenue slump of 1982 and reach higher profit potentials beginning with 1983, Mathews advised operators to move from a "passive" mode to an "active" one in terms of marketing and integrating all components of their business. Demonstrations were given by Bob and Susie Mathews on the HTU and new PEP unit, followed by Frank Delfer and his discussion of Pay 80. Susie Mathews also highlighted the features of Release 6.7 for the benefit of Group W participants — Robert Faust, V.P.; Richard Hilton, Controller, Richard Simon VP MIS; Joel Kopel, Director Support Services; Anita Nailler, Operations Mgr. & MIS Project Coordinator; James Hudson, Controller, SE; James Falletti, Controller, SW; Dennis Farrell, Controller, NW; and Joel Cohen, Controller, NE. The group toured the bill production factory and CableData's new facility which houses National Hardware and HTU Manufacturing.

CableData is currently working with Group W to put together a massive on-line network proposal to handle Group W's systems nationwide. ■

Videotex West Conference

by Maggie Wilderotter

The first Western Conference on videotex was held in Beverly Hills on November 29 - December 1, 1982. Several topics were discussed in panel format with a question and answer period at the end of each session. The main focus of the three day conference was on how to develop a business out of videotex: what the consumer perceives as needed services and how to deliver those services to the consumer.

Videotex, in simple terms, is the delivery of interactive services to the consumer marketplace with the most talked about services being shopping, banking, electronic mail, and news. But, most of the interest is still in the developmental stage as video pioneers like AT&T, Time, and CBS struggle with how to deliver these services into the home.

There was a concensus on one topic: Teletext needs to be the stepping stone to prepare the consumer for full two-way interactive services. Teletext uses a page linkage scheme to deliver one-way services into the home. The most popular teletext services are electronic news and magazine services.

Richard Gingras, Director of Advanced Media Development for KCET-TV in Los Angeles who conducted a teletext development trail using an electronic news magazine, stated that "in order to make videotex and teletext a business, we need to establish a market based on consumer needs to make them realize the added value to their lives." Gingras also pointed out that teletext and videotex need to develop their own place in the market. Using a graphic display screen to provide information is a different medium than the average consumer is

used to. "Small screens are hard to read and are difficult for prolonged usage," stated Gingras. Because of this, format and uniqueness in screen displays is crucial for the success of both teletext and videotex. Gringas suggested that a creative style different from printed materials like newspapers and magazines needs to be developed.

Jim Holly of Times Mirror Videotex Services feels videotex will be a local business and not a national business at the consumer market level. Holly stated that Times Mirror will be using the cable as the delivery system for interactive services with a telephone uplink. The local cable operator would accumulate service information from local retailers, financial services and information providers with a national system integrator also feeding into the cable operator for national information content. Times Mirror is also conducting experiments in the use of two-way cable to deliver interactive services. Holly stated "two-way cable has the long run advantage of dealing with the present graphic limitations and allows us to get into still images. Two-way cable can handle these problems."

Other presentations discussed using the personal computer market as the way to provide videotex and teletext in the home and there is still no agreement in the industry that the graphic standard, Teledon, will be widely accepted by information providers in the United States.

The conference ended on a positive note with Dave Simons, President of Digital Video Corporation, stating that "There is vast potential for development of teletext and videotex but the effort needs to be a joint one involving many companies. Interested companies need to stop all the talk and get going on action."

Ironically, there was very little participation by the cable industry at the conference — even though the cable seems to be the best delivery method for interactive services.

The next conference, Videotex '83, will be held in New York City next June. The sessions will be sponsored by London On-Line, Inc. in conjunction with the Videotex Industry Association (VIA). ■

SHORT BYTES

- According to the Trade Advertiser's Index, CableData was the 7th largest advertiser in communication journals in 1981 and the 11th largest advertiser in 1982.

- In spite of its young age, Pay-Per-View has already generated revenues of more than $31 million with subscriber "buys" totalling 2.4 million. Moreover, pay-per-view has helped introduce monthly pay services to substantial numbers of new customers.

The Third Wave Western Show

It's a constant source of amazement how many new products keep cropping up at cable gatherings like the Western Show in Anaheim this year. If programming and creative ideas flowed as rampantly as new technological innovations, cable operators wouldn't have a problem filling 100 channels with fresh, block-busting programs each week. Strolling through the exhibit halls of the Anaheim Convention Center was much like traveling the pages of Alvin Toffler's book "The Third Wave" where the industrial age has humbly succumbed to the electronic future. At every bend a new satellite receiver, multiplexor, data splicer, fiber optic, addressable converter, videotex, teletext . . . it's only when you turn the corner to face the Playboy Channel booth that you are comfortably reminded some things will never change after all.

If you were in the area of Playboy's booth, as most of the conventioneers were at one time or another, you probably also caught CableData's demonstration which drew a large share of traffic right next door. CableData introduced its new PEP unit (Phone Entry Processor) as an automated method of handling large-volume, pay-per-view orders. Through the use of CableData's Tandem on-line information systems and one-way addressable home terminal units, PEP handles customer orders without the assistance of customer service representatives. PEP uses a human voice-synthesized vocabulary to ask pay-per-view customers specific questions regarding their choice of programming possibilities, while concurrently checking the customer's account balance and payment history. Judging from the comments and conversations of on-lookers, PEP promises to be an effective solution to the growing problems of making pay-per-view as profitable and managable as possible.

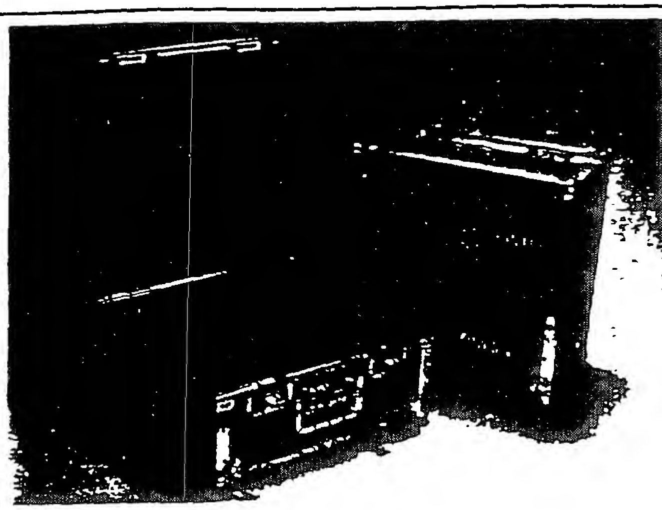
William R. Cullen (left), President of the Tribune Company of California, visits with Ray Matteson, CableData's Vice President of Sales.

Participants at CableData's booth were also witness to demonstrations of the company's full line of software and hardware systems, as well as its one-way addressable home terminal units, the HTU.

While crowds at this year's show seemed slimmer than at shows recently gone by, it appears that the decision-makers were out in full force. Several operators commented that with the economy in its current state and everyone tightening the strings on their budgets, cable systems were sending fewer employees to the many conventions across the country and more top-level management individuals instead . . music to the ears of exhibitors such as Ray Matteson, CableData's Marketing Vice President, who remarked, "We did more immediate business and concluded more contracts than we did at any one show in the past." ■

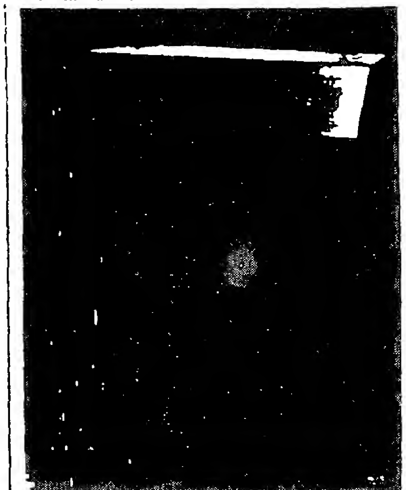
Rj SMITH (left), CableData's Director of National Accounts, talks with Richard J. Watterman, District Manager of the Costal District of Group W, at the Western Show.

New Products and What They Can Do for You



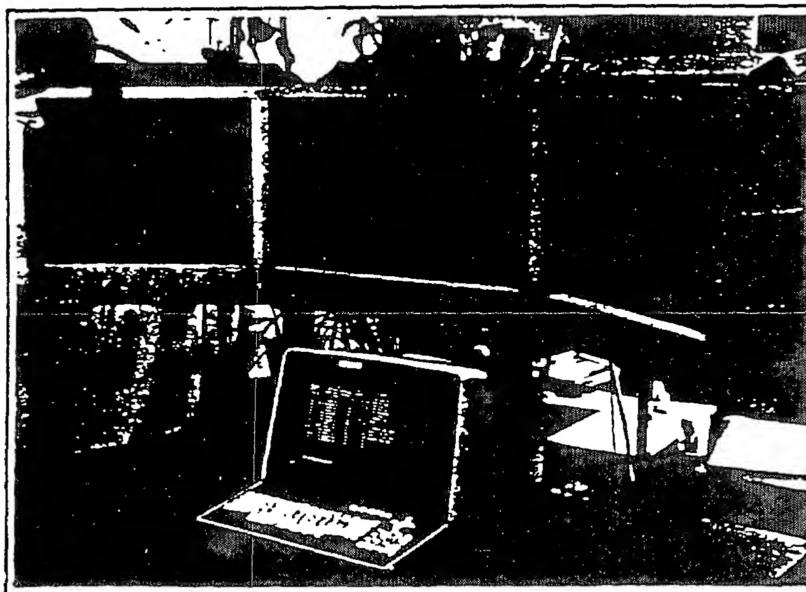
TAPE CARRY CASE

What condition are your tapes in? If they're in the same condition as the packages they are mailed to CableData in, we've got a real problem. Each month, tapes come in cardboard boxes, manilla envelopes, padded wrappers, grocery bags, and in any other way you can imagine. Protect your tapes by placing them in the new Tape Carry Case from CableData. Constructed with steel edges, durable plastic, and lined with supportive styrofoam, the case is surprisingly light and economical to mail. Each case can hold up to 12 tapes, along with all corresponding fiche and paper reports. Price: $199.95.



B300 PRINTER

Printers are usually housed in out-of-the-way places because they make a lot of racket when they're working. Not so with the new B300 Printer. It has its own acoustical cabinet that significantly reduces the operating noise level. Manufactured by Data Products, the B300 is built for dependable operation, quality printing . . . and quiet service. Price: $7,185.00.



MTU

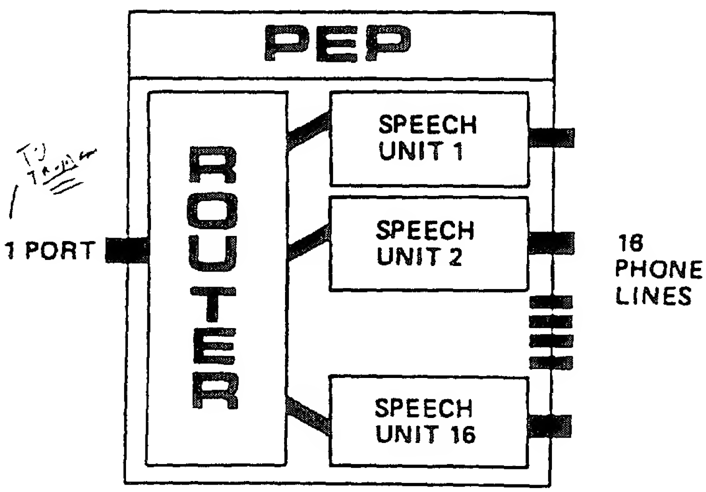
If you ever had to juggle between CRT display screens to get the total picture before completing a transaction or reaching an accurate decision, you can appreciate CableData's new multi-terminal unit, the MTU. It allows operators to glance at three simultaneous data screens. The MTU is particularly geared towards accommodating the function of the cable system dispatcher, but can be adapted to any cable business function. Exclusively designed and manufactured by CableData for its on-line customers, the MTU is now available. Price: $10,000.

CAPS

DDP wants to help you handle all of your business, including your finances. New from CableData is a General Ledger, Accounts Payable, and Fixed Assets package that places all accounting functions on-line for immediate assessment, effective cash management, and versatile financial reporting. CAPS (CableData Application Package Systems) provides a valuable, flexible tool for planning and controlling the finances of your cable TV business. In direct response to customers who want to enhance their multi-application Tandem operations. Includes customer services support from the regions, complete training, and all enhancements. Available to all On/Line Exclusive, Shared, and Mini users. Prices: GL — $500/mo.; AP — $300/mo., FA — $200/mo.; Conversion Fee — $1,000 plus expenses.

CRT REPAIR KIT

On-line customers with an ailing Zentec terminal can now fix it on the spot. The new CRT Repair Kit from CableData provides enough spare parts to replenish two complete terminals. All components are individually packaged for mailing convenience. Simply place the failed part in its carton, mail to CableData, and you'll receive a working part ASAP. In the meantime, you don't have to live with downtime because you can install a new part to your terminal, on-site, to get it up and running immediately. The kit comes complete with tools and an easy-to-understand manual that takes a layman through each repair, step-by-step. Eliminate terminal downtime with a CRT Repair Kit. Price: $2,400.



PEP

A new way to handle those last-minute, large-volume, pay-per-view orders without adding more phone lines and customer services representatives. With a human-like synthesized voice, the Phone Entry Processor (PEP) allows your customers to communicate directly with your Tandem's database and order special events any time of the day. Customers call a special number and respond to PEP's automated questions by depressing the appropriate keys on their telephone units. And before it authorizes the delivery of a special event, PEP automatically checks the customer's balance and payment history. One PEP unit can accommodate 16 phone lines and all major addressable converters, although it excels with CableData's HTU. PEP interfaces with the Order Entry program. Capitalize on your one-way addressable system with PEP. Price: $16,000.

For more information and literature on all products, contact the Marketing Department (916) 485-2911. ■

Do-It-Yourself-Programming

While CableData prides itself on its highly parameterized, versatile DDP software which solves most problems for most customers, it cannot accommodate everybody, everytime with specialty programming. However, what CableData can do is provide the tools for operators to write their own unique programming applications. And that's just what we intend to do.

TBOL, CableData's programming language is now available for purchase to all On/Line Exclusive System users. With the TBOL language, operators will have the opportunity to program their own enhancements and business application programs *around* the DDP data base design. They will be, however, prohibited from writing directly to, or modifying, CableData's DDP files. Because of the complexity of the language, programming expertise is necessary, and having on-site hardware is a prerequisite; all other on-line users are precluded from purchasing this option at this time.

What Comes in the TBOL Package?

Operators purchasing the TBOL Package will receive:

- All DDP file layouts
- Programmers Reference Manual (PRM) written by CableData programming specialists
- CableData's Routine Library on tape
- Updates to all file layouts and Programmers Reference Manual as they are published.

CableData's National Software Support department at corporate headquarters will provide 90 days of programming support to each user purchasing the TBOL Package. After this time, users can extend the support period upon discretion. Meanwhile, CableData's regional staff is currently undergoing training in DDP programming principles with CDIT IV Training and will be able to provide programming support to all Exclusive TBOL users from the regions after March, 1983.

Ground Rules

- It is an absolute prerequisite that a cable system have an experienced programmer on staff before CableData will release the TBOL Package. CableData also reserves the right to approve the qualifications and expertise of that individual in the customer's best interests.
- All material distributed to the cable system is proprietary to CableData and cannot be duplicated for resale or granted to others for perusal. All users will be required to sign a statement to this effect.
- All CableData DDP and CAPS (CableData Application Package Systems) files are available on a "read" basis only. Customers cannot modify or write to our existing files.
- Changes to our DDP software or data base design are done by CableData at our discretion which may impact programs previously written. Exclusive TBOL users must recognize this and be prepared to modify their programs to deal with such changes, if necessary. (Release 8.0 will be a complete file redesign.)

For On/Line Exclusive System customers adventurous enough to write their own programming, CableData supports your right to be individualistic! All Exclusive customers interested in the TBOL Package should contact the Marketing Department at (916) 485-2911 for more information and prices. TBOL is available now. ■

Short Bytes

- Pay 80 Update — plans are underway to provide training for Pay 80 from the regions. The turnover is scheduled for March 1, 1983. For conversion from Cable 80 to Pay 80, key corps personnel will attend regional training classes to complete their systems' conversion parameters; data entry into the system parameter file will also be done at the regions with the National Software Support Tech Group monitoring all entries and staging the conversion runs. New Business will handle all Pay 80 conversions with new corps coming on CableData. Pay 80 will be released complete with a T-30's manual and documentation.

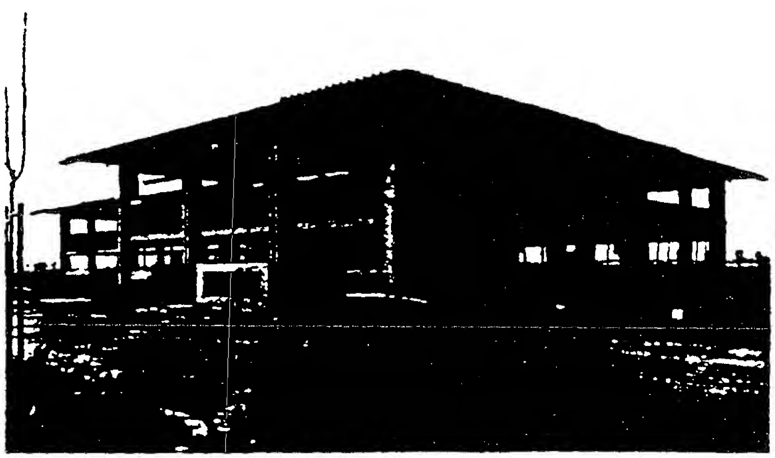
- CAPS — Business Software Director Larry Shaw and his group are putting together a two-day training session for regional personnel, demonstrating how to convert systems to CAPS. This training is slated to occur in late January, putting expertise out into the field by mid-to-late February.

Vice President of Hardware Development

Mike Neal

Bob Mathews announced the promotion of Mike Neal to Vice President of Hardware Development in a recent meeting of CableData's management staff. The new post marks the company's concentrated focus on the computer hardware arena. In his new executive capacity, Neal, former Hardware Director, will continue to be responsible for hardware research and development, implementation, and maintenance. Under Neal's leadership as Director, the hardware department has undergone significant reorganization in the past year resulting in a 24-hour customer services hardware support group, a strengthening of the field engineering staff, the formation of comprehensive hardware training classes, and an in-house department equipped to test, analyze, and modify hardware behavior. Among his many accomplishments are several innovative products introduced this year by his department, the MTU — a multiple-terminal unit that displays three simultaneous data screens, and the CRT Repair Kit, designed for do-it-yourself repairs of Zentec terminals.

Prior to CableData, Neal owned an independent contracting firm but has long since traded in his own business license for his fascination of computers. A CableData veteran of five years, Neal brings to his new post a wealth of hardware experience and a firm commitment to implement better operating methods. ■



CableData's secound building in its new complex east of Sacramento is scheduled for completion in February.

Jack Szlak

New Western Region Sales Manager

"With the cable television and computer industries at the tip of the iceberg, career opportunities are unlimited," remarked Jack Szlak of his new appointment at CableData. With twelve years of computer sales experience, Szlak joins CableData as Western Region Sales Manager, reporting to Al Markus, Director of Sales. Prior to CableData, Szlak was with Sperry Univac as Sr. Sales Consultant where his responsibilities included sales and installations of mainframe computer systems. He also worked for Digital Equipment Corp. and IBM in a sales capacity and is well-versed in everything from mini to mainframe computer systems. A graduate from Sacramento State University with a degree in Business Administration, Szlak recently completed CableData's Intensive Training (CDIT) and looks forward to putting his experience and knowledge to work for CableData's customers in the western region. ■

Customer Survey Shows Marked Improvement in Services

The second customer services survey conducted last August illustrated a marked degree of improvement in services for CableData customers over the past year. 66.6% of all customers responding to the survey rated CableData's overall performance "good to excellent," as compared to last year's rating of 52.4% in the same categories. Rating their respective CableData products, 31.5% of all respondants ranked their products "very best" to "one of the best" on the market. The concensus of this year's survey is "good product — services dramatically improving."

Another major improvement has been accomplished in the arena of expertise. Both the statistics and general comments in the survey reflect customer perceptions of increased knowledge, effectiveness, and professionalism on the part of our regional staff. 65.8% of all Business Office Managers surveyed and 64.5% of all General Managers surveyed rate the regional service "excellent" to "good." A large minority, 20.5%, reflect that they do not have *any* problems with customer services.

1981 What You Wanted Improved	1982 CableData's Progress
• Turnaround Times	• Last survey, 52.0% of all customers indicated turnaround to be "fair to poor"; this year, 76.6% rate CableData's turnaround time "good to excellent."
• Training of both CableData and cable system personnel	• 65.8% of all respondants now indicate the regional service to be "good to excellent" based on CableData's in-house training efforts (C.D.I.T.); customer training continues to be a hot button for 1983.
• Better Communication	• A marked improvement in communication between CableData's corporate and regional offices, and between CableData and customers. Different time-zones between regional offices and Sacramento continue to be an inherent problem which should slowly fade as expertise levels continue to escalate in the regions.
• Legibility of Microfiche	• Still an issue, however, according to CableData officials, new microfiche equipment and staff should eliminate this problem in the next few months.

Some of the comments:

"We've been with CableData since January, 1981 and the services have greatly improved."

"I have worked with CableData over five years and I see a great deal of improvement. Thanks!"

"In my recent dealings with your Atlanta office, I have noticed a definite improvement in the knowledge and responsiveness of your reps."

"I appreciate your much improved representation."

"It's a look of professionalism . . ."

Another area with marked improvement, and one which greatly pleases the entire staff at CableData, is customer attitude. 65.6% of all customers surveyed indicated that they felt "important and well taken care of"; last year, most of them felt anonymous. The attitude of "I am just one of many customers" is on a rapid decline which reflects the success of our deliberate efforts to provide a personal service to each customer regardless of how large we grow.

In general, according to survey statistics, CableData is equalizing the wide spectrum of customer satisfaction levels revealed in the first survey. The scale is beginning to tip towards better relationships, better services, and better products for all customers, Cable 80, Terminal 1500, and on-line users alike.

1982 Survey Results

Positive Feedback	Needed Improvements
• Excellent turnaround time	• Microfiche Quality
• Very pleasant and helpful customer services regional staff	• Inserting Controls
• Better communication	• Customer Training & Documentation
• Continuous efforts to improve services	• Keypunch accuracy
• Dynamic on-line software	• Timeliness of return calls
• Professional management staff	

Group W Conducts Aggressive Training Program

Milton Jackson and Marla Warner (second and third from left) of CableData's Western Region, chat with Paul Kaplan, Jack Denton-Wilson, Deborah Wakeman and Carolyn Davenport of Group W at their training sessions.

Last October in Los Angeles, Group W conducted a week-long training seminar for all of its system employees in the Los Angeles area, in which CableData was asked to participate. While Group W management focused on its corporate policies, personnel functions, reporting procedures, and system operations, CableData provided four days of intensive training on its on-line computer systems. A complete Tandem system and terminals were installed to give Group W employees hands-on experience while Marla Warner, Western Region Manager, conducted the lecture in CableData's behalf.

Deemed successful by Group W and CableData representatives alike, the seminar marked an awareness of not only the need for in-house training within the cable industry, but the integral role of the computer in that industry. ■

Training in February

ATLANTA REGION	INDIANAPOLIS REGION
DDP, Order Entry/ Dispatch. .Jan. 31-Feb. 4 Terminal 1500. . . . . Feb. 2-11 Terminal 1500. . . . .Feb. 14-18 DDP, Collections / Reports . . . . . Feb. 21-24	DDP, Order Entry/ Dispatch. . Feb. 28-Mar. 4
PHILADELPHIA REGION	**SACRAMENTO REGION**
DDP, Order entry/ Dispatch. . . . Feb. 14-16 DDP, Director File. . . . . .Feb. 16-18 DDP, Collections/ Reports. . . . . Feb. 22-25	Please check with regional office.
DALLAS REGION	**SACRAMENTO CORPORATE**
DDP Collections/ Reports. . . . . Feb. 7-9 DDP Order Entry/ Dispatch. . . . . . . Feb. 14-18	No management seminar scheduled.

REGIONAL OFFICES:

ATLANTA, GA.	(404) 451-8200	Karl. Turner. Regional Manager
DALLAS, TX.	(214) 239-8157	Norm Nicholson. Regional Manager
INDIANAPOLIS, IND.	(317) 848-7841	Ron Byerly. Regional Manager
PHILADELPHIA, PA.	(215) 328-5000	Joe LaGrossa. Regional Manager
SACRAMENTO, CA.	(916) 485-2911	Marla Warner. Regional Manager

CORPORATE OFFICE:

SACRAMENTO, CA. (916) 485-2911

NEW CUSTOMERS

On/Line

VIACOM. Cleveland. OH
HERITAGE COMMUNICATIONS. Bartlett. TN
TELE-VUE. Grants. NM
CABLENET. Lethbridge. Canada
UA COLUMBIA. Brookhaven. NY
VIACOM. Dublin. CA
MIAMI CABLEVISION. Miami. FL
CENTEL COMM.. Lake Zurick

Cable 80/Terminal 1500

CABLE HOLDINGS. Luling. LA
UNITED VIDEO. Freeport. MA

Turnaround Times

	Reports	Statements
December, 1982	31.9 hrs.	51.4
November	25.8	37.8
October	33.4	47.4
September	32.2	47.8
August	35.1	55.2
July	41.0	57.8

VIA CABLE

Produced and published by CableData

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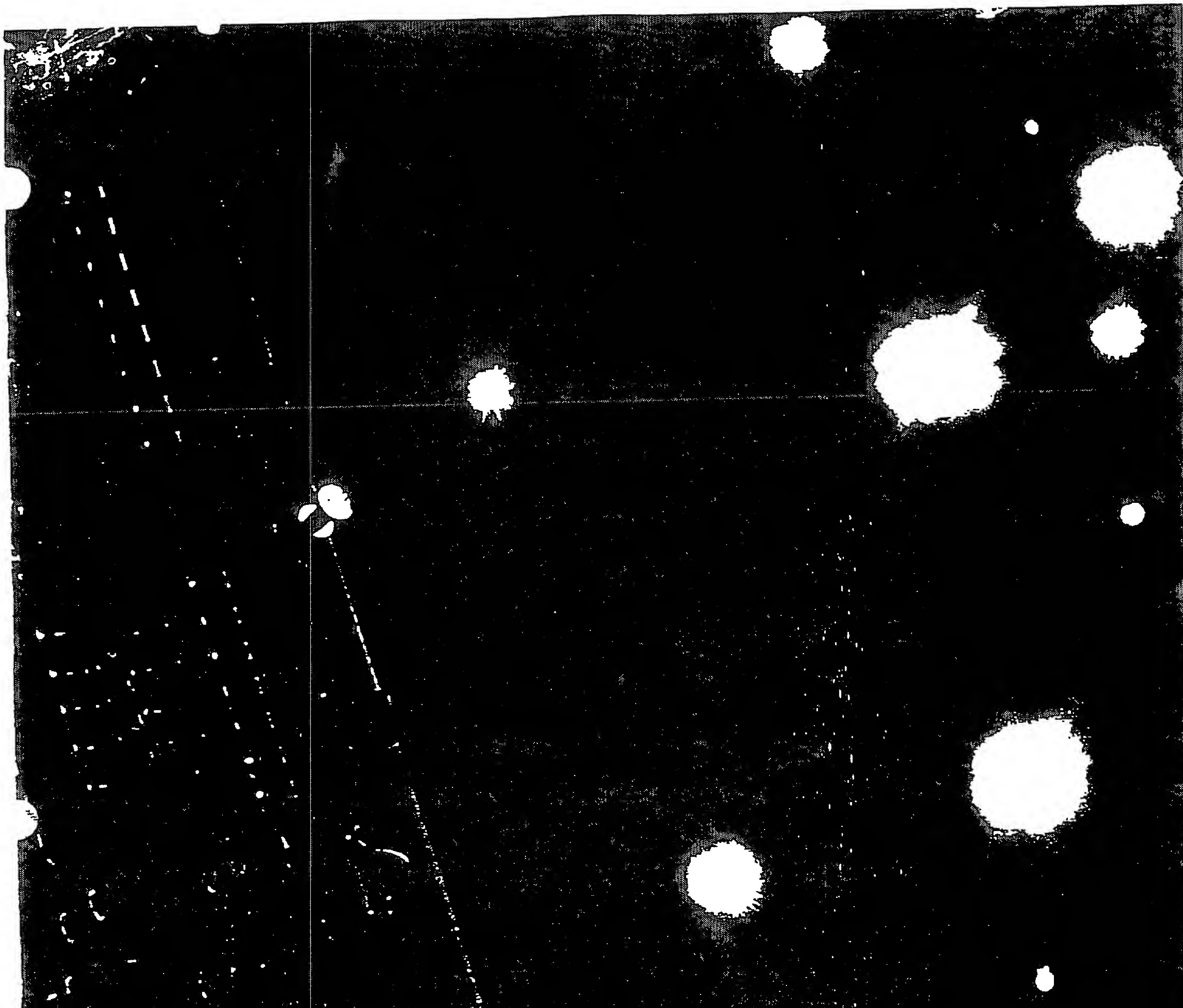

cable data
U.S. Computer Systems
Annual Report
1982

The Growth of Cable Television

In the early 1950's, someone placed an antenna on top of a mountain, attached a coaxial cable to it, and cable television was born. Since that time, the industry has followed a bumpy path. Although the late 1950's brought in the use of microwave receivers to pick up distant signal programming, the whole business was stymied by the Federal Communications Commission in 1960, when they ruled that the importation of distant signals was illegal.

The budding industry went into the doldrums until 1975 when pay television was born. Pay TV signals are sent by satellite, a transmission means not covered by the FCC's 1960 ruling. The cable industry grew large enough to bring pressure to bear on the FCC, and in 1979, the ruling was reversed, allowing for the tremendous cable explosion in the last few years.

In 1982, there was an estimated 82,100,000 television households in the United States — the potential cable market. Out of this number, only 30 million people presently subscribe to basic cable; some 50% of basic subscribers also take one or more pay services. The number of cable subscribers is expected to reach 58,900,000 by 1990.

Technologies are now in place for cable to grow and expand into a number of new and exciting areas, such as home security, information retrieval services, teletext over the cable, video games, per-program pay television and computer assisted learning.

These are possible because of the advent of addressability. An addressable converter (the piece of equipment which connects the subscriber's television set to the cable office) has the capabilities to activate and deactivate services, upgrade and downgrade services, and provide security from tampering and theft. In addition, some addressable converters such as CableData's Home Terminal Unit, actually work as a computer in the home — allowing the cable office to communicate directly to a subscriber and allowing the subscriber to communicate with the cable office. It is predicted that by 1985, 62% of the converters in place in subscribers' homes will be addressable.

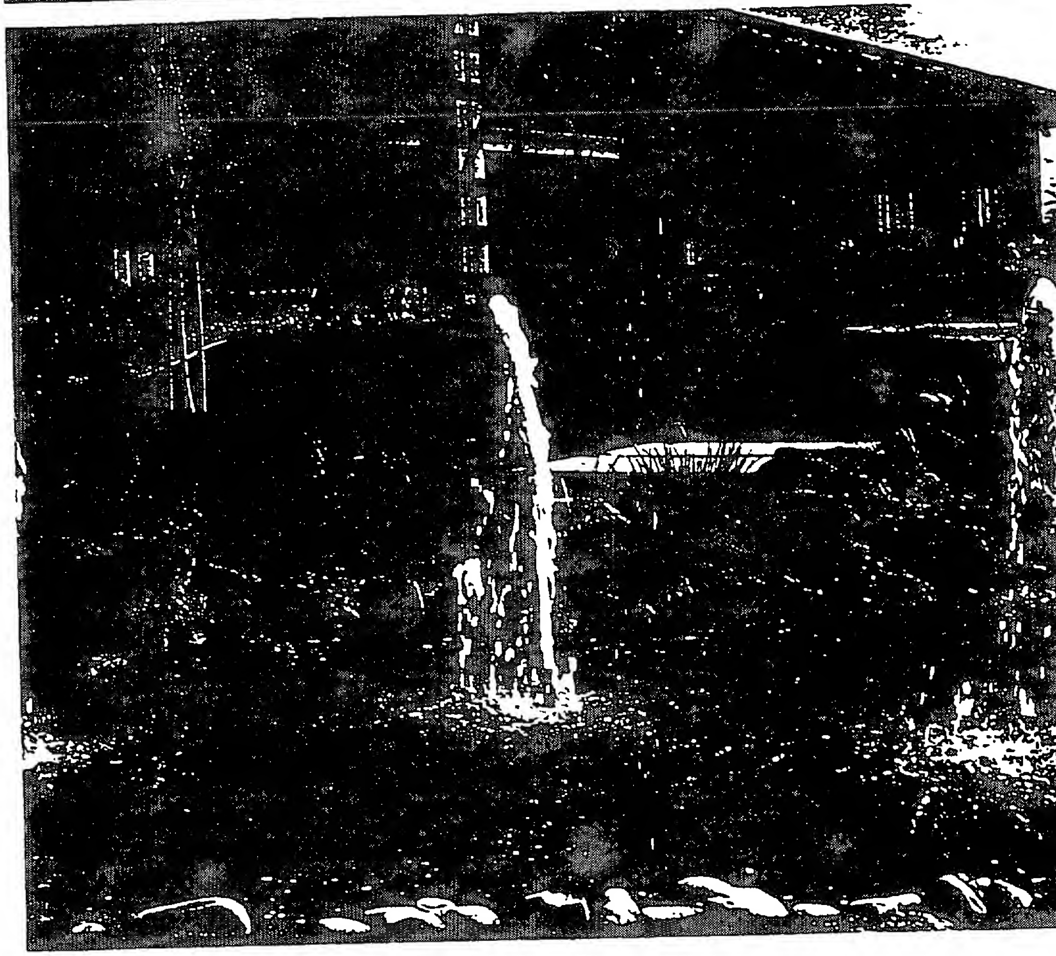
The advent of addressability also brings a new profit potential to cable operators in the form of pay-per-view programming. For systems already utilizing addressable boxes, pay-per-view offers an enticing opportunity to increase revenues without increasing overhead costs. A pay-per-view event is usually a special event such as a fight, a play or blockbuster movie that is offered separate from the regular monthly service the subscriber has contracted for.

According to research done by CableData's Marketing Department, cable operators will be able to double their incomes by using addressability, and pay-per-view events. With this kind of profit potential, it seems very likely that addressability and pay-per-view will come of age in the 1980's.

About the Cover: A Tandem circuit board is one of the many products leading CableData into the future.

CableData
U.S. Computer Systems
Annual Report
1982

Entrance to Western Regional Offices at new site east of Sacramento.



Contents

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Broomall, Pennsylvania 19008

Midwestern Region
1329 W 96th Street
Indianapolis, Ind 46260

Southeastern Region
4950 Keller Spring Road
Dallas, Texas 75248

Western Region
11020 Sun Center Drive
Rancho Cordova, Calif 95670

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289 Belfast Court
Oshawa, Ontario, Canada L1J6K7

Subsidiaries
CableLease
60 East Sir Francis Drake Blvd
Larkspur, Calif 94939

CableGames
11020 Sun Center Drive
Rancho Cordova, Calif 95670

Independent Accountants
S J Gallina and Company
and
Coopers & Lybrand

CableData was founded in 1965 with four objectives in mind:

1. To assemble a staff thoroughly familiar with the special needs of cable television as well as the intricacies of computer data processing.
2. To maintain a facility with greater processing capabilities than could be justified by the subscriber volume of any one group of cable companies acting alone.
3. To schedule the facility so that each participating customer could share the benefits and economies with full equity
4. To utilize the full potential of production efficiency in order to make the greatest contribution to client profits

After 17 years, CableData has not faltered from its original commitment to the cable television industry· to provide the best possible products and services to help the cable operator control his business In fact, our drive to fulfill that original commitment is even stronger today.

Our commitment has been demonstrated over the years by our ability to keep abreast of the ever changing technology that has propelled the cable industry into the multi-billion dollar a year business it is today.

In 1982 we laid the groundwork for the new CableData — a manufacturing company as well as a data processing company I am pleased to say we added 270 new employees during the year for a total of 708 people employed in Sacramento and our regional offices. We also strengthened our management team by hiring and promoting many new directors and other top management staff.

Dave Barnes, as executive vice president, has been bringing this team together Two new vice presidents are now in place. Milo Rodich is responsible for MSO Sales and Relations for the East Coast and Mike Neal was promoted to Vice President of National Hardware Support, National Software Support and Regional Administration I feel we now have a team in place to handle comfortably our expanding responsibilities in the cable market

Research and development expenses increased 357% over the previous year in preparation of the launch of our new addressable converter, the HTU (Home Terminal Unit) Manufacturing facilities are presently being completed at our new corporate complex We expect to begin mass production in September and project 600,000 units in place by the end of 1984. We feel the HTU will have a significant impact on addressability in the cable industry because it is software driven and, in effect will turn a television set into a computer.

The technologies we are learning about today will change the whole complexion of how we communicate. The television can and will be transformed into a device capable of receiving specific information from various data bases requested by the viewer — cable television already has the delivery system in place to make this happen The challenge of developing these new technologies is both exciting and rewarding

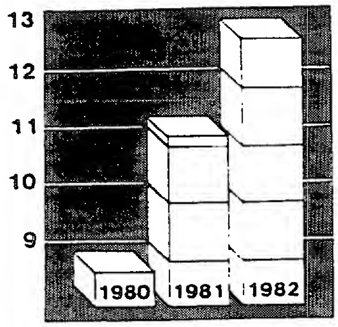
At CableData, we look forward to turning these challenges into golden opportunities We view the cable television industry — our industry — with the same entrepreneurial spirit that has made cable television what it is today. Because of that we are now more than ever, fully committed to cable television

Robert J. Mathews
President
March 9, 1983

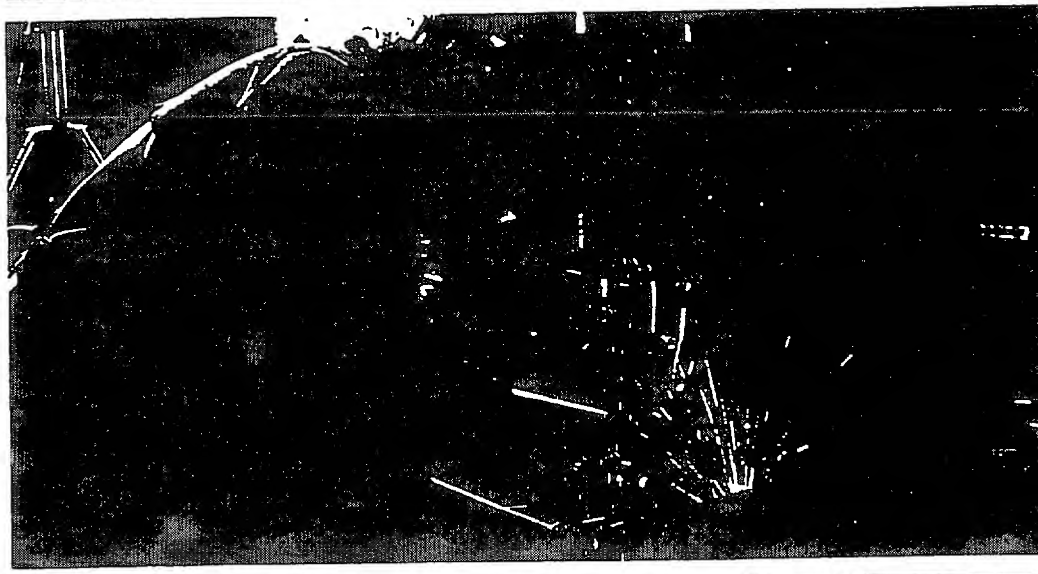
1982 in Review

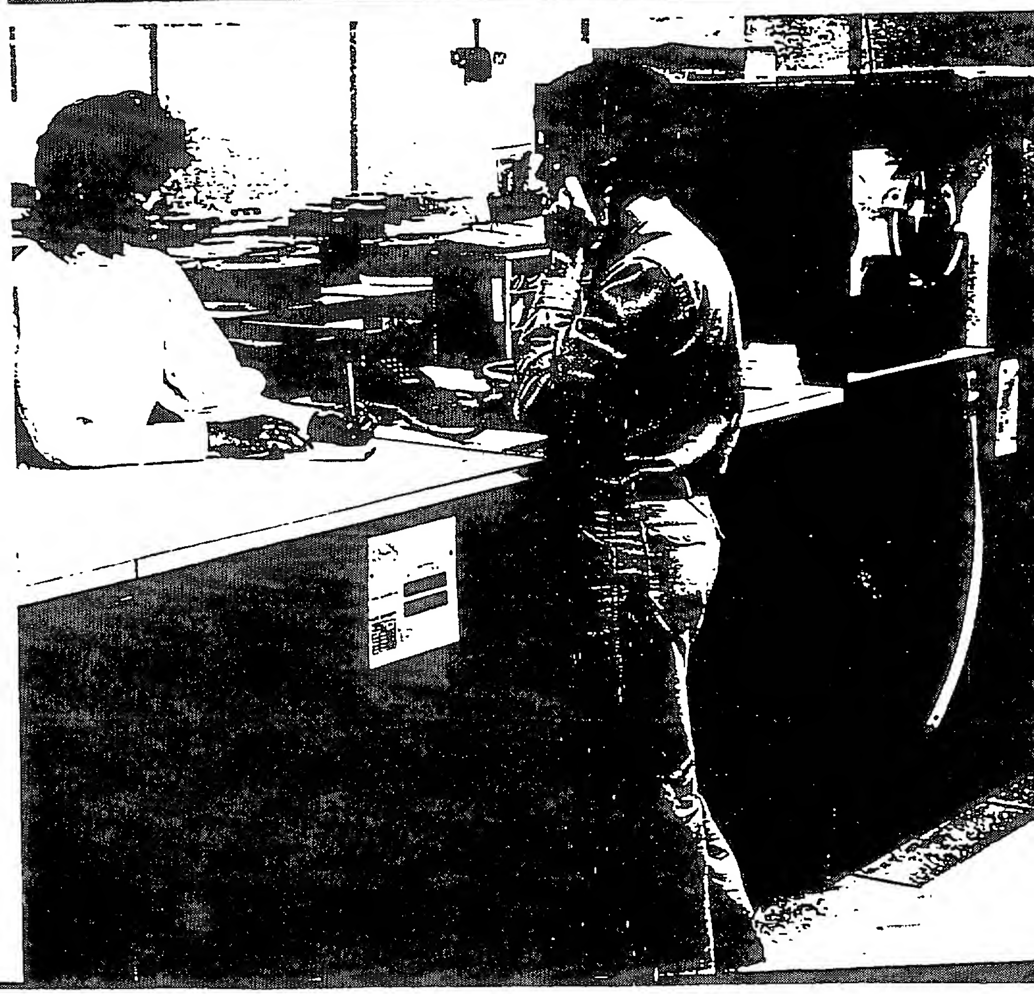
Top: Walder working in Research and Development Department.

Bottom: CableData's Computer Operations.



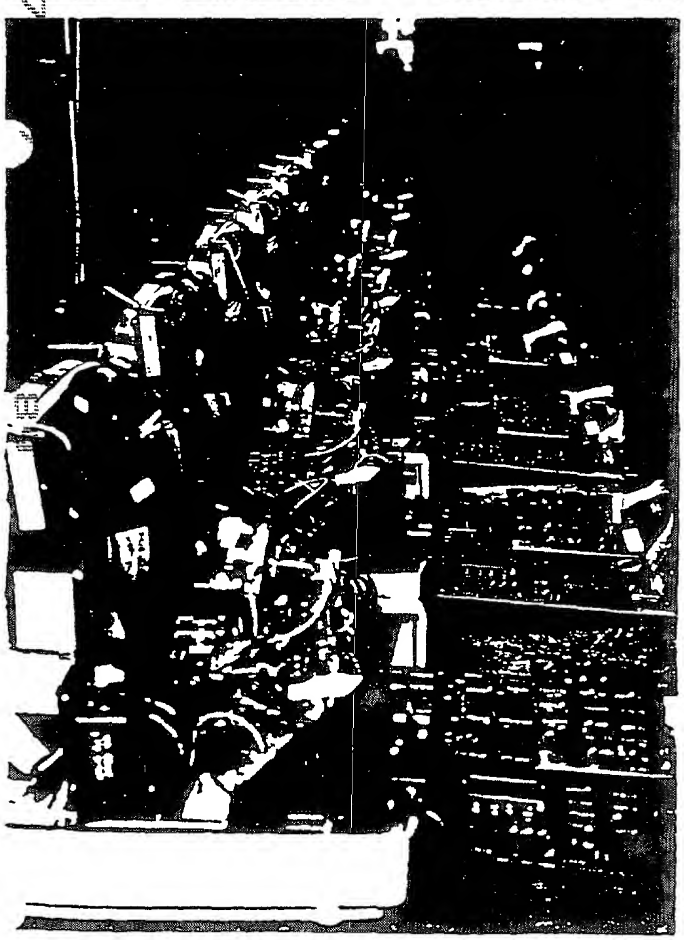
SUBSCRIBERS PROCESSED
(Millions)





Top: National Training Classroom

Bottom: CRT's undergoing testing in Hardware Staging area



1982 proved to be the year of investing in the future. CableData spent more than $1.5 million in research and development, an increase of almost 400% over 1981. Among the results of this research was the introduction of several new products in CableData's product line — the Phone Entry Processor (PEP) for automatic order taking, the Multiple Terminal Unit (MTU) for cable office dispatch functions, and the continued development of our addressable converter, the Home Terminal Unit (HTU), and its manufacturing process.

CableData experienced a net cable subscriber growth of 1.8 million in 1982, a 16% increase from 1981. The number of subscribers billed at December month-end totalled 12.9 million, approximately 50% of the total cable television market.

With all the growth came the need for more space. Twenty-one acres east of Sacramento became the site of what will eventually be five buildings containing 320,000 square feet for CableData's corporate headquarters. The first 83,000 square foot building was completed in 1982 and now houses HTU Development and Manufacturing, National Hardware Support, Graphics and Printing, National Training, and the Western Regional office. Construction is nearing completion on the second building, designed for the administrative areas and software development.

Revenues totalled $41.8 million, an increase of 17% over the previous year, and net income was up 20% to $3.8 million. Working capital increased by $5.9 million during the year, and a $20 million bank line of credit was arranged to support the development and production of the HTU.

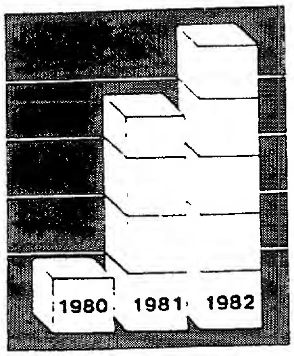
In keeping with the CableData philosophy of controlling all aspects of our business, we began manufacturing envelopes for our use. In November our first envelope manufacturing machine was installed and was soon producing in excess of 15 million envelopes a month. CableData mails nine million statements out to subscribers the last 10 days of each month. The envelope demand is now totally satisfied internally by our envelope manufacturing facility. With this new capability, CableData can now provide a higher quality envelope to the Inserting Department to improve the efficiency of that operation. We also have the ability to offer our customers an additional service of producing custom envelopes to their specifications.

Another development that had a significant impact on growth was the effectiveness of CableLease, our wholly owned leasing subsidiary, which was formed in September 1981. CableLease provides our customers a convenient source of financing and allows us to offer the entire On-Line package — equipment, software, training, installation, maintenance — and now financing from one source. During 1982, CableLease successfully arranged 22 lease transactions for On-Line Systems.

CableData has achieved its outstanding growth — not only because of the growth in the industry, but because of the commitment of employees who are striving to keep CableData at its best. We believe the groundwork laid in 1982 will be the foundation for an even stronger CableData tomorrow.

Software/Hardware Products

Bottom: Viacom San Francisco using CableData Executive System



CLIENTS SERVICED

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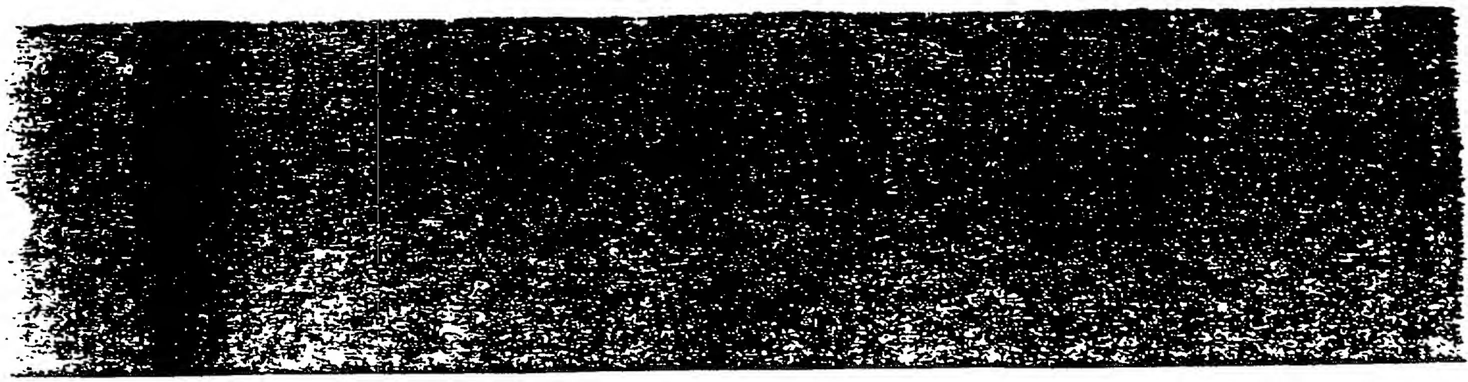


Software

CableData's software products have set the standards in the industry for the past 15 years Good software is the foundation on which CableData has built its business We currently employ 40 programmers who are continuously working on enhancements and new software products so that we can maintain our software quality

Our first software product. Cable 33 quickly evolved from a simple billing program to a sophisticated means of totally controlling a growing cable business Thus emerged our next software product. Cable 80. which is still used by more than 500 of our customers today In 1975. CableData marketed its first on-line computer system With this new technology came the advent of dispersed data processing (DDP). CableData's On-Line Software System. Since its inception. DDP has gone through seven major rewrites of its 144 programs and dozens of mini releases This level of flexibility is necessary for the cable operator. in order to keep pace with the changing cable industry

Our DDP software. which is used by 150 on-line customers provides order entry scheduling. dispatch. billing inquiry payment processing collections. refunds. management reports — in short. total control for the cable operator The system is designed to eliminate paperwork increase efficiency. and give the cable operator greater visibility into the day-to-day operations of his or her business All points in the organization are connected — business office dispatch. customers and technicians in the field

In 1982 a new software product was introduced — CAPS (CableData Application Package Systems) CAPS is a comprehensive accounting package that works with the DDP software. It includes programs for both accounts payable and general ledger. completing a total management information system for cable. CAPS was specifically designed for the user: all transactions can be edited by the user and such things as the report writer can be highly parameterized to provide any information requested

Our newest software product is Pay 80. a more sophisticated means of handling some of the needs of the industry Pay 80 has been designed to make the handling of multiple tiers of service easier for the cable operator and to allow for greater accounting and reporting capabilities

Another recent development in the cable industry is the introduction of addressable converters — a piece of equipment that connects the subscriber s home to the cable office and allows automatic turning on and off of channels and events Unfortunately. no one had the capability to monitor the converters they were not connected to the cable business computer. so control was very hard CableData. in response to industry demand. immediately developed an addressable interface that integrates the converters into our DDP software The DDP software actually controls all aspects of the converters. issuing the commands for activation and deactivation of all channels This addressable interface now works with all major converters Presently 21 of our on-line customers are utilizing the addressable interface to link their billing system with converter operations

Hardware

Our hardware commitment is equally as strong as our software CableData has a full support team of hardware specialists who are continually evaluating our present hardware capabilities and testing the latest products in the market Our hardware team also designs and builds products when necessary to meet the needs of the industry

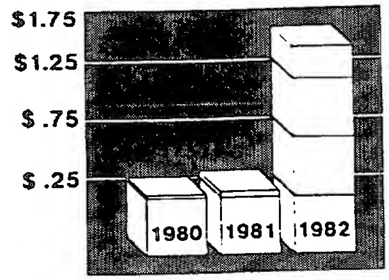
At the core of our on-line system is the Tandem computer renowned for multiple independent processors and non-stop capability Each Tandem has two processors. thus ensuring that the loss of one will never shut down the system In the event of a failure in one processor. the other processor takes control automatically The Tandems are specially configured and rigorously tested at CableData's corporate offices before shipping

Our hardware specialists also configure all the peripherals within the system to make sure they are compatible with the Tandem and our software requirements in order to maximize data throughput and response time for the customer

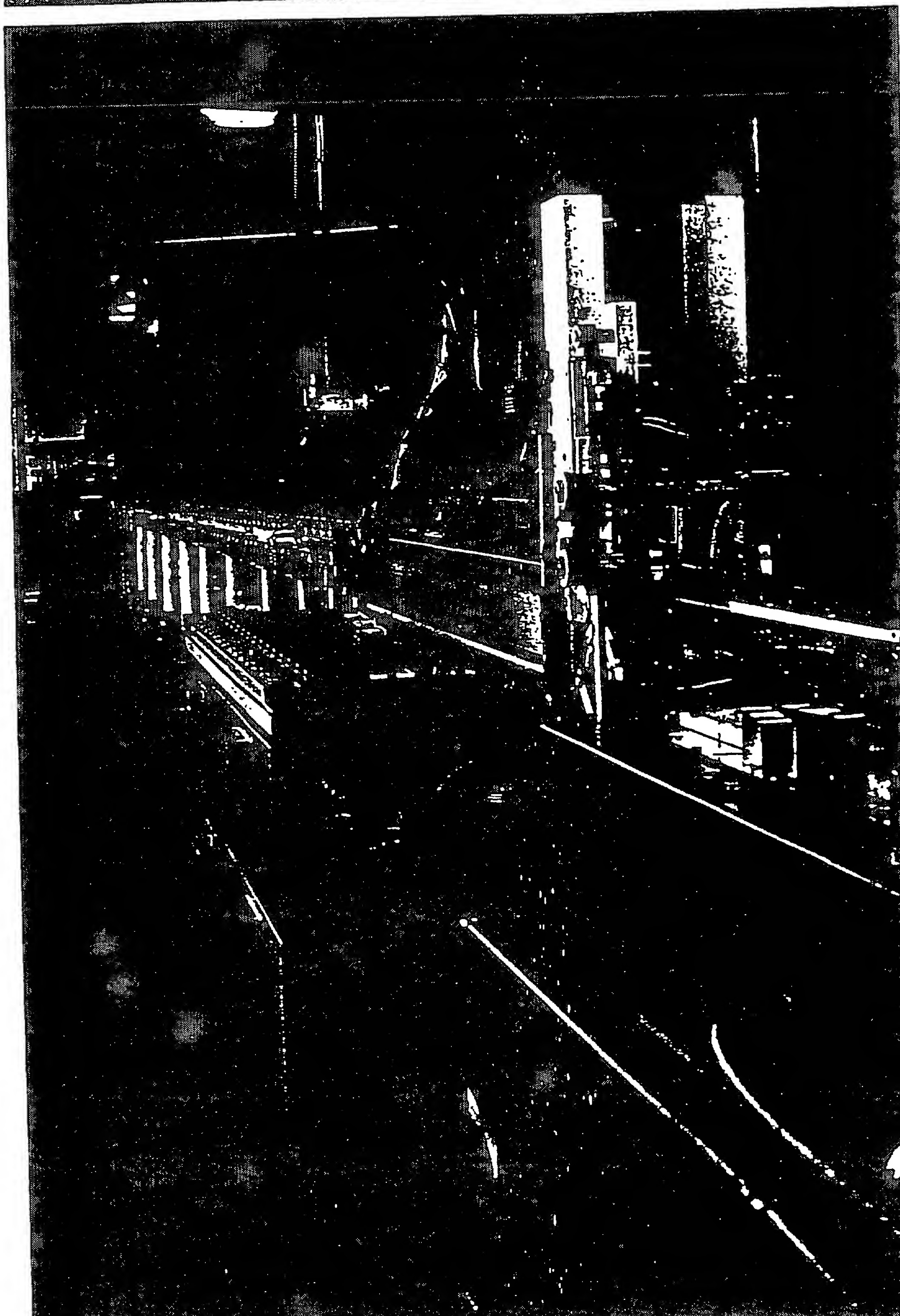
Another exciting hardware development that occurred in 1982 was the introduction of the MTU (multiple terminal unit) This is a multiple screen device that allows a cable operator to glance at three simultaneous data screens for immediate assessment and decision making It is especially useful in the dispatch area where the operator can be monitoring a current day's work evaluating the next day's schedule and looking at data on a specific technician

New Products

RTU assembly line



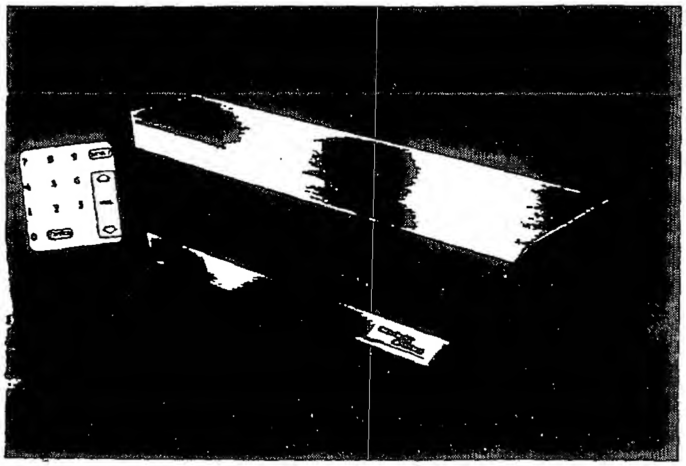
R & D EXPENSES
(Millions)

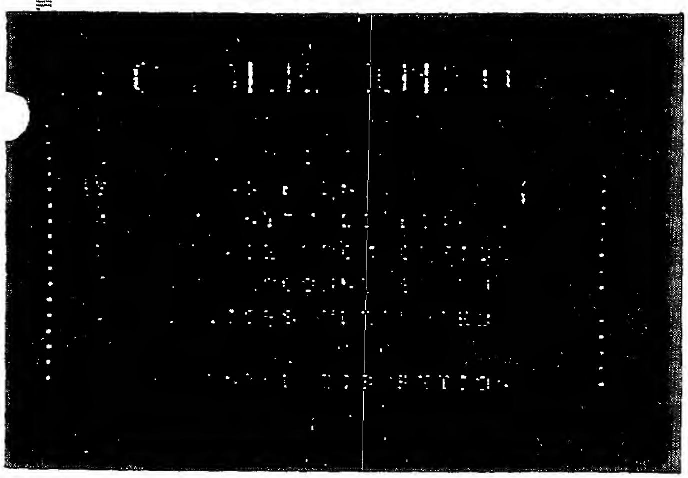


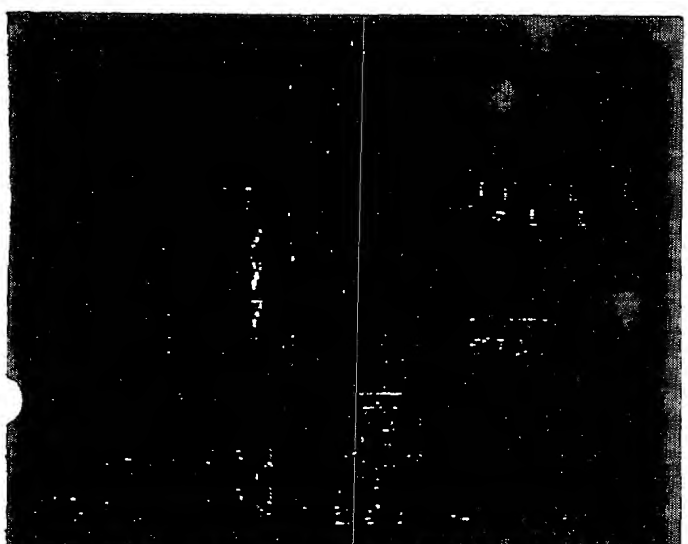
Top: Home Terminal Unit (HTU) and remote control device.

Middle: [illegible] graphics that display on a customer's television.

Bottom: [illegible] developed for the HTU by CableGames, a subsidiary of CableData.







HTU

The most significant development in hardware in 1982 was the final planning and testing of the Home Terminal Unit (HTU), a software-driven addressable converter. The HTU marks CableData's entry into the electronic manufacturing field. For the first time, cable operators will have the capability to link all components of their business into one streamlined and economically efficient addressable system. The HTU is peripheral to and interactive with our on-line business systems, making it a powerful extension of the cable office into the subscriber's home.

All addressable converters perform several basic functions: activation and deactivation of services, random baseband descrambling, remote control; security; ability to handle multiple tiers and special events. But CableData's HTU is in a class by itself.

The HTU delivers a host of visual services to the subscribers and makes them an active part of the cable operation. The cable operator can send personalized messages to subscribers with graphics and color, such as a display of account status, welcome messages or disconnect notices.

The HTU also provides such things as a community directory, program guide, coming events, listing of cable services offered and those that have been purchased by the subscriber, and parental discretion codes to allow parents to determine what programs their children can watch.

The HTU is manufactured by CableData at its national headquarters east of Sacramento. Assembly lines utilizing robotics and other new manufacturing techniques are in place with mass production scheduled by the end of 1983.

With a projected number of television households estimated at 58 million by 1990, the marketplace for the HTU is practically unlimited.

CableGames, a new subsidiary of CableData, was organized in 1982 to develop educational and fun games for children of all ages. Already more than 30 games have been developed that can be played right on a TV set connected to a cable office via the HTU.

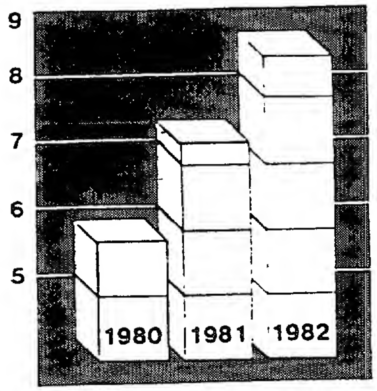
PEP

An exciting component designed to work with the HTU is the Phone Entry Processor (PEP) that allows automatic order taking. PEP is an automatic voice processing device designed to handle large volume pay-per-view orders without the assistance of customer service representatives. The subscriber simply dials a special telephone number from any push-button telephone. PEP utilizes a human-voice vocabulary to ask the customer specific questions relating to the transaction. The customer responds by depressing appropriate buttons on the telephone. While the customer is communicating directly to the Tandem computer in the cable office, the computer is checking such things as account number, status and payment history before it confirms and authorizes the delivery of the event. PEP is manufactured exclusively by CableData.

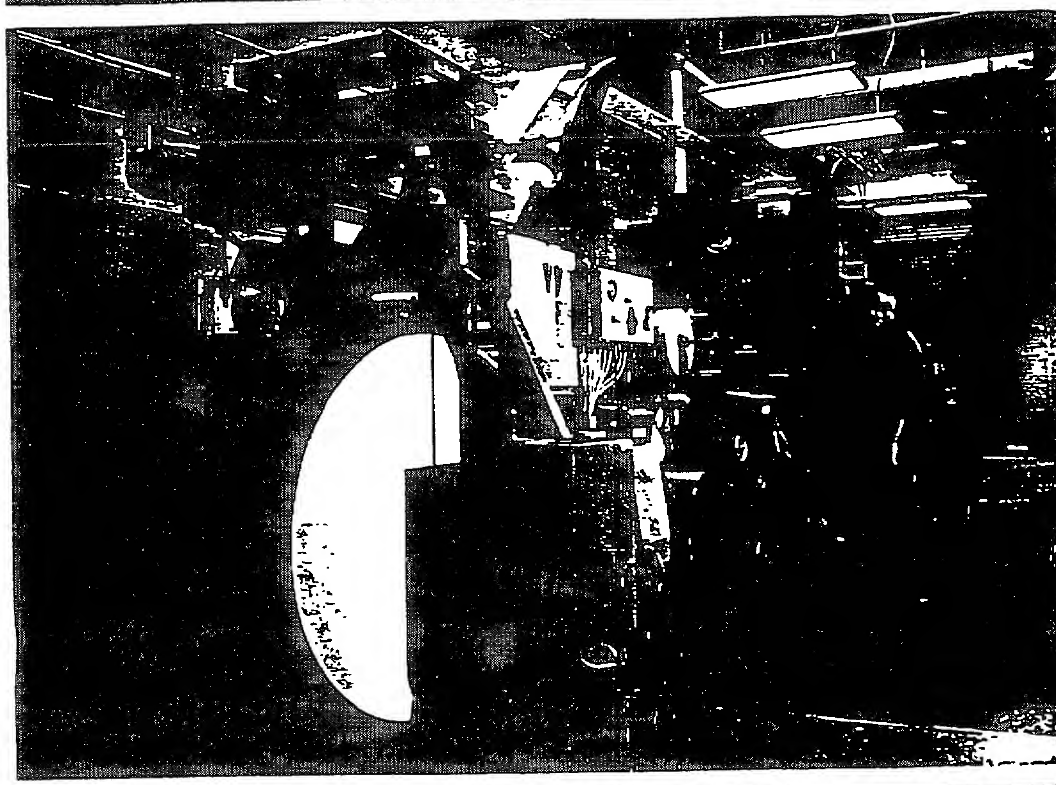
Billing/Data Processing

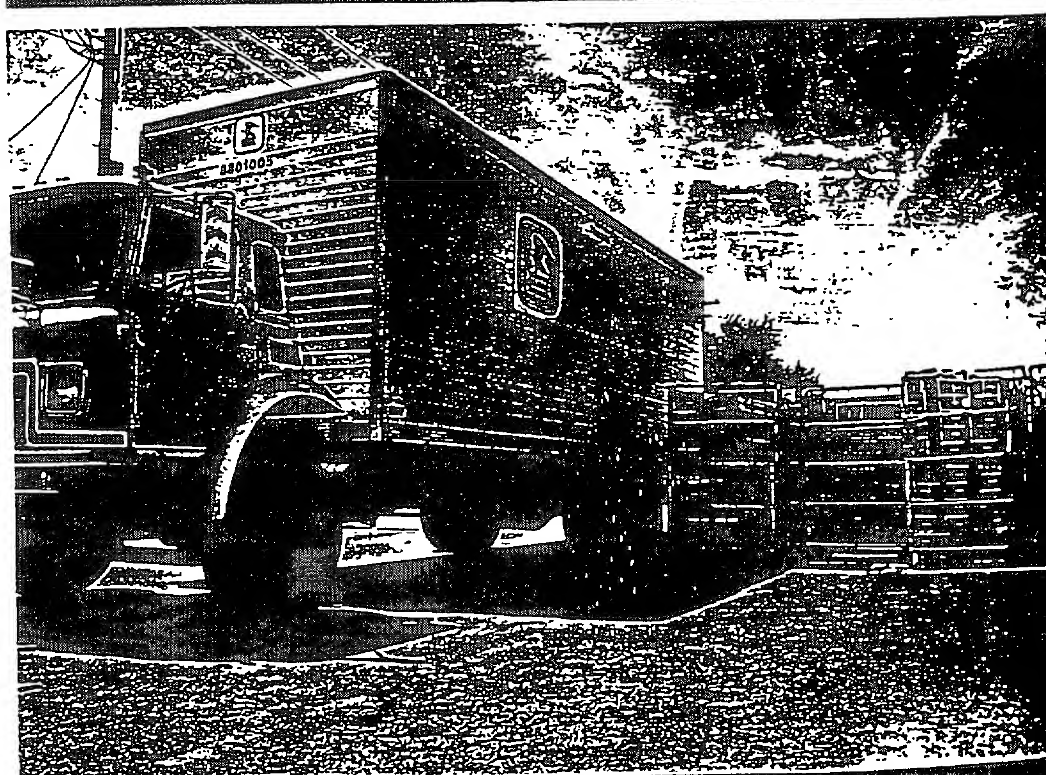
Top: Envelope Manufacturing [illegible] CableData service.

Bottom: A small sampling [illegible] of mail sent out each month from CableData's billing area.

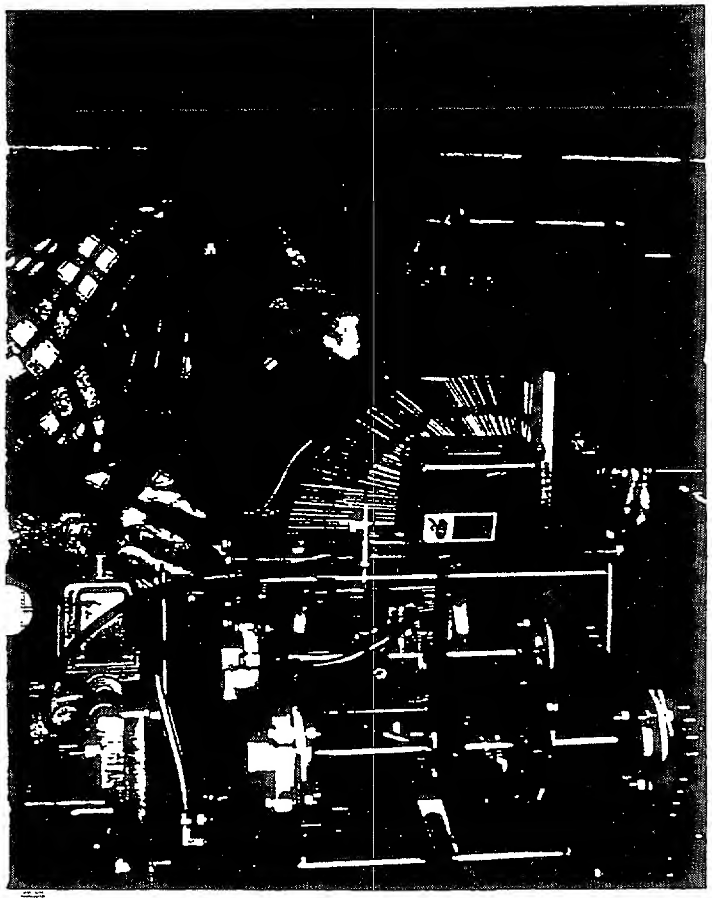


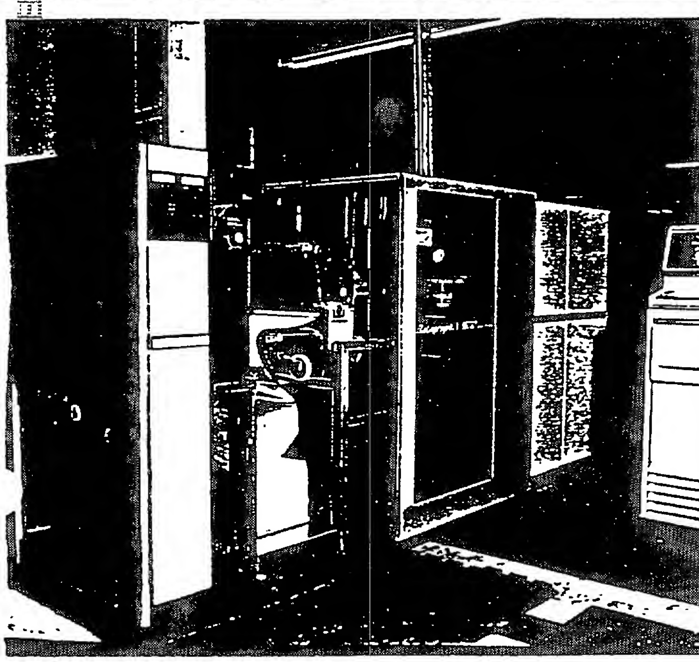
STATEMENTS MAILED
(Millions)





Top: Employee checks an insert on the Thiele inserting machine.
Bottom: High-Speed Laser Printer





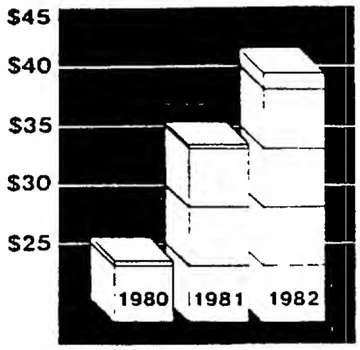
In order to process 12.9 million subscribers and mail out nine million statements every month, CableData's billing factory has to utilize the latest in advanced technology and equipment. We spent more than $5.8 million in capital expenditures in 1982, a portion of which was used to improve our billing factory. This figure includes the purchase of a second laser page printer, which prints some 500,000 statements a day. The laser printers and our ten impact Telex printers together can produce 2.2 million statements a day.

Once statements are printed, they move on to our next piece of equipment — a "burster-folder-merger" machine which was completely developed and manufactured in house by CableData's engineering team. We utilize two of these machines that automatically trim, split down the middle (statements are printed two-up), fold, merge and stack statements in zip code order at a speed of 1.9 million statements in a 24-hour period.

The final stage of the billing process is inserting. The Thiele Corp. of Minnesota developed a rotary inserter exclusively for CableData. We now utilize three of these inserters, as well as nine Phillipsburg inserters, to process a combined total of 2.2 million statements a day.

Because of our size, we actually have a representative from the U.S. Post Office at our Arden Way facility to weigh and charge postage every month. This allows us to deliver our statements direct from the factory to the airport. We now mail 180 tons of mail each month from our Sacramento office. Turnaround times for processing customers' reports averages 33 hours; statements are processed in an average of 48 hours. Our size, efficiency and speed allow us to process our customer data and mail subscriber statements at a fraction of what it would cost our customers to duplicate this service.

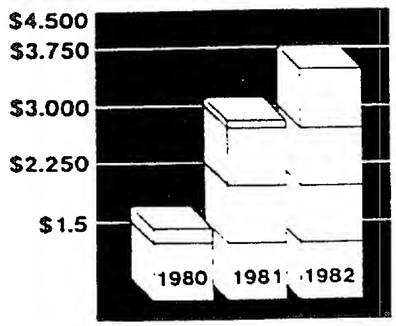
U.S. COMPUTER SYSTEMS
(D/B/A Cable Data)



SALES (Millions)

Contents

Statement of Income

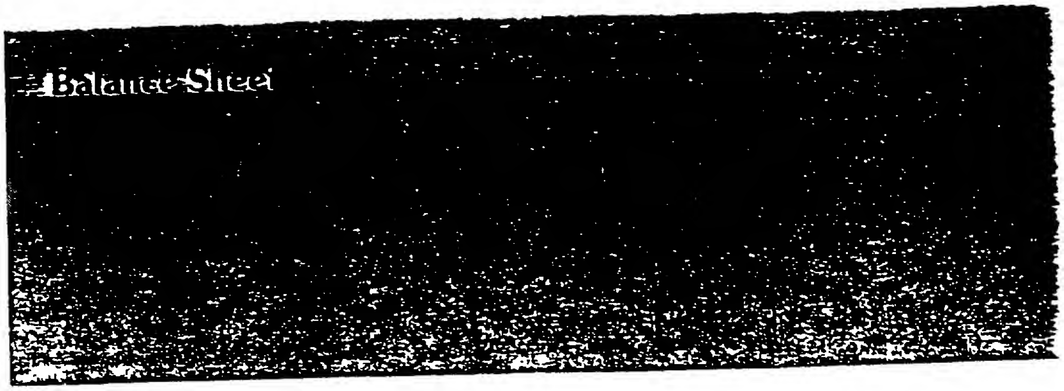


NET INCOME (Millions)

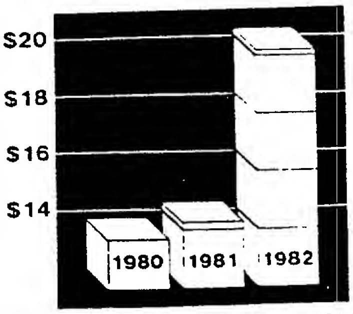
FOR THE YEARS ENDED DECEMBER 31 1982 AND 1981
(Amounts in thousands except share data)

	1982	1981
Revenues:		
Data processing	$23 035	$18.311
Equipment sales	10 122	11.126
On-line services	8 680	6 159
Total revenue	41 837	35 596
Costs and Expenses:		
Wages, payroll taxes and employee benefits	12 720	9 342
Equipment costs lease and maintenance costs	8 831	9 189
Data processing supplies	3 865	3.233
General operating expenses	8 465	6 886
Total costs and expenses	33 881	28 650
Operating income	7 956	6 946
Other Income (Expense):		
Interest expense	(1 084)	(1 148)
Investment income (loss) from non-consolidated subsidiary (Note 4)	(573)	(110)
Miscellaneous	(847)	(197)
Total other income (expense)	(2 504)	(1 455)
Income before income taxes	5 452	5 491
Income Tax Expense: (Note 10)	1 692	2 367
NET INCOME	$ 3 760	$ 3 124
EARNINGS PER COMMON SHARE	$ 9 62	$ 7 81

The accompanying notes are an integral part of the financial statements



Balance Sheet

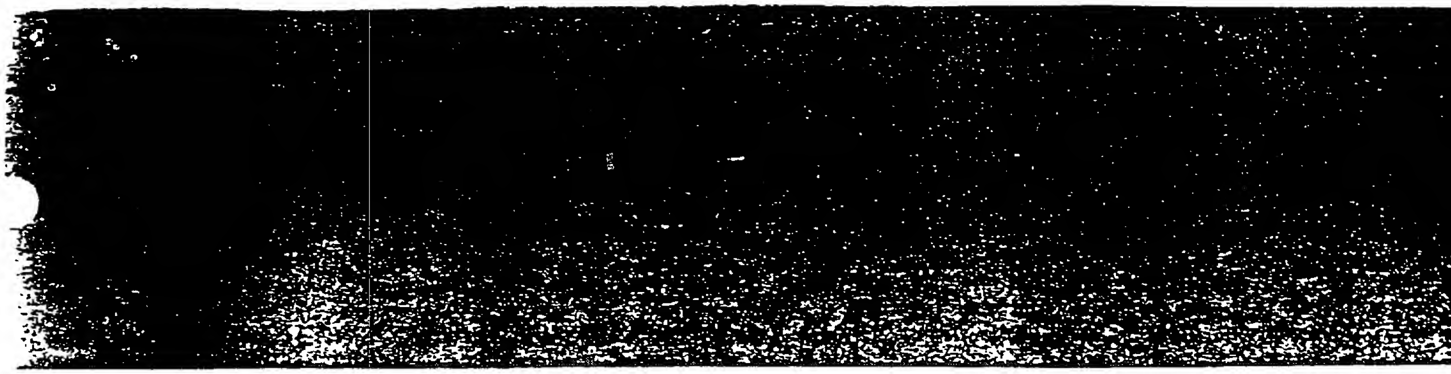


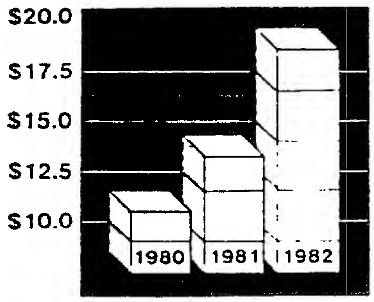
EQUIPMENT AND LEASEHOLD IMPROVEMENTS (Millions)

DECEMBER 31 1982 AND 1981
(Amounts in thousands)

	1982	1981
Current Assets:		
Cash	$ 664	$ 320
Accounts receivable net of allowance for doubtful accounts of $35 in 1982 and $65 in 1981 (Notes 1 7 and 12)	11 711	7 916
Supplies, at cost	648	318
Inventory (Notes 2 and 7)	3 507	3 060
Prepaid expenses and deposits	489	546
Deferred income tax benefits	259	431
Total current assets	17 278	12 591
Equipment and Leasehold Improvements: (Note 7)		
Computers and production equipment (Note 3)	17 685	12 621
Office equipment	659	433
Leasehold improvements	1 876	1.294
Capital projects in process	1 077	—
	21.297	14.348
Less accumulated depreciation and amortization	10 790	6.801
Net equipment and leasehold improvements	10 507	7.547
Investment in and Advances from Non-Consolidated Leasing Subsidiary (Note 4)	34	224
Other Assets:		
Notes receivable (Note 5)	507	307
Other	34	47
Total other assets	541	354
TOTAL ASSETS	$28 360	$20.716

The accompanying notes are an integral part of the financial statements





CAPITALIZATION (Millions)

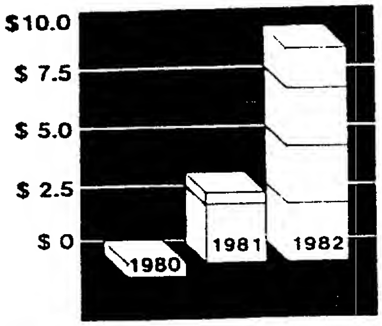
DECEMBER 31, 1982 AND 1981
(Amounts in thousands except share data)

LIABILITIES AND STOCKHOLDERS' EQUITY

Current Liabilities:	**1982**	**1981**
Annual credit line	$ —	$ 3,000
Current maturity of long-term debt (Note 8)	82	74
Accounts payable	6,188	3,368
Accrued payroll and payroll costs	647	461
Accrued employee stock ownership plan contributions (Note 6)	550	312
Other accrued expenses (Note 12)	970	1,057
Income taxes payable	22	1,405
Total current liabilities	8,459	9,677
Noncurrent Liabilities:		
Revolving credit line (Note 7)	7,500	2,400
Long-term debt (Note 8)	118	200
Deferred income taxes	1,325	755
Total noncurrent liabilities	8,943	3,355
Stockholders' Equity:		
Common stock $10 par value		
Voting 2,000,000 shares authorized 257,866 shares issued and outstanding in 1982 and 277,255 in 1981	26	28
Non-Voting 2,000,000 shares authorized 128,854 shares issued and outstanding in 1982 and 120,169 in 1981	13	12
Capital contributed in excess of par value	1,467	1,042
Retained earnings	9,452	6,602
Total stockholders' equity	10,958	7,684
TOTAL LIABILITIES AND STOCKHOLDERS' EQUITY	$28,360	$20,716

The accompanying notes are an integral part of the financial statements

Statement of Changes in Financial Position

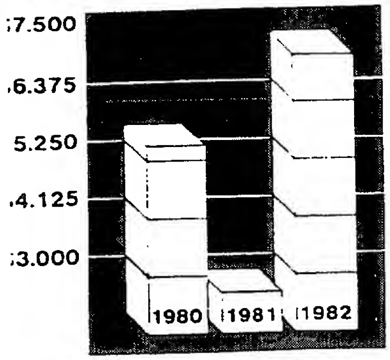


WORKING CAPITAL
(Millions)

FOR THE YEARS ENDED DECEMBER 31 1982 AND 1981
(Amounts in thousands)

Working Capital was Provided from:	**1982**	1981
Operations		
Net income	$ 3 760	$ 3 124
Items not requiring (providing) a current outlay of working capital		
Depreciation and amortization	3 303	2.789
Deferred income taxes	570	472
Loss (gain) on disposal of equipment	170	(54)
Write down of idle equipment to fair market value	445	214
Working capital provided from operations	8 248	6 545
Decrease in investment in and advances to non-consolidated leasing subsidiary	190	—
Proceeds from disposal of equipment	430	431
Transfer of equipment to inventory	—	233
Proceeds from revolving credit notes	7.500	—
Issuance of common stock	721	232
Total working capital provided	17.089	7 441
Working Capital was Applied to:		
Reduction of revolving credit line	2 400	800
Additions to equipment and leasehold improvements	7 308	2.621
Increase in investment in and advances from non-consolidated leasing subsidiary	—	224
Increase in other assets	187	82
Reduction of long-term debt	82	69
Redemption and retirement of common stock	1.207	416
Total working capital applied	11 184	4.212
INCREASE IN WORKING CAPITAL	$ 5.905	$3.229

The accompanying notes are an integral part of the financial statements



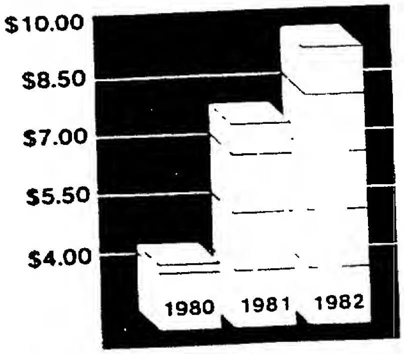
CAPITAL EXPENDITURES
(Millions)

FOR THE YEARS ENDED DECEMBER 31 1982 AND 1981
(Amounts in thousands)

Changes in Components of Working Capital:	**1982**	1981
Increase (decrease) in current assets		
Cash	$ 344	$ 36
Accounts receivable	3,795	2,119
Supplies	330	(12)
Inventory	448	1,640
Prepaid expenses and deposits	(58)	270
Deferred income tax benefits	(172)	67
Increase in current assets	4,687	4,120
Increase (decrease) in current liabilities		
Annual credit line	(3,000)	750
Current maturity of long-term debt	8	8
Accounts payable	2,820	(833)
Accrued payroll and payroll costs	186	(32)
Accrued employees' stock ownership plan contributions	238	(130)
Other accrued expenses	(87)	245
Income taxes payable	(1,383)	883
Increase (decrease) in current liabilities	(1,218)	891
INCREASE IN WORKING CAPITAL	$ 5,905	$ 3,229

The accompanying notes are an integral part of the financial statements

Statement of Changes in Stockholders' Equity



EARNINGS PER SHARE

FOR THE YEARS ENDED DECEMBER 31 1982 AND 1981
(Amounts in thousands except share data)

	NUMBER OF SHARES	COMMON STOCK VOTING	COMMON STOCK NON-VOTING	CAPITAL CONTRIBUTED IN EXCESS OF PAR VALUE	RETAINED EARNINGS
BALANCE January 1 1981	403 639	$28	$12	$ 874	$3.830
Redemption and retirement of shares (Note 11)	(15 420)	(1)	—	(64)	(352)
Issuance of stock bonus	1 850	—	—	34	—
Sales of shares	7 355	1	—	198	—
Net income	—	—	—	—	3 124
BALANCE December 31 1981	397 424	28	12	1 042	6 602
Redemption and retirement of shares (Note 11)	(15 420)	(2)	—	—	(692)
Issuance of ESOP shares	8.685	—	1	370	—
Stock sales to individuals	7 902	1	—	350	—
Repurchase of shares	(11 871)	(1)	—	(295)	(218)
Net income	—	—	—	—	3 760
BALANCE December 31. 1982	386 720	$26	$13	$1 467	$9 452

The accompanying notes are an integral part of the financial statements

Significant Accounting Policies

Non-Consolidated Subsidiary — The Company's investment in its non-consolidated leasing subsidiary, U S Computer Systems Leasing (D/B/A CableLease) is accounted for by the equity method

Inventory — Inventory consists of computer equipment which is stated at the lower of cost (determined on the first-in, first-out method) or market

Research and Development Cost — Research and development costs are expensed as incurred

Equipment and Leasehold Improvements — Equipment and leasehold improvements are recorded at cost Expenditures for renewals and betterments, where significant in amount, are capitalized and depreciated Maintenance and repairs which do not improve or extend the life of an asset are expensed

Depreciation is recorded principally on the declining balance method for income tax reporting for assets acquired prior to January 1 1981. Assets acquired on or after this date use the ACRS method of cost recovery For financial statement purposes, both the declining balance and straight-line methods are used with useful lives ranging from 3 to 7 years

Taxes on Income — The Company files consolidated federal income and consolidated or combined state income tax returns where permitted, with CableLease The income tax expense includes tax benefits related to the operation of CableLease Deferred income taxes are recorded to reflect differences in reporting certain items for financial statement and income tax purposes for both the Company and CableLease The more significant differences relate to accounting for capital lease transactions, depreciation accrued maintenance and state franchise taxes

Investment tax credits are accounted for by the flow-through method as a reduction of income tax expense in the period the related assets are placed in service

Earnings Per Share — Earnings per share computations for 1982 and 1981 are based on the weighted average number of shares outstanding during the year

Notes to Financial Statements

1 Accounts Receivable (in thousands)

Accounts receivable at December 31 1982 and 1981 are comprised of

	1982	1981
Due from unaffiliated customers	$ 8 [illegible]	$ 6 428
Less allowance for doubtful accounts	35	6[illegible]
	8 06[illegible]	6 363
Federal Income Tax refund for 1982 estimated taxes paid	537	
Due from other related party		750
Due from non consolidated subsidiary for purchase of computer systems	3 088	803
	$11 71[illegible]	$ 7 916

2 Inventory (in thousands)

Inventory consists of the following components at December 31

	1982	1981
On line equipment	$ 3 206	$ 2 613
Terminal equipment		340
Other equipment		107
Electronic parts	301	
	$ 3 507	$ 3 060

The on line equipment at December 31 1982 and 1981 includes an open stock of computer hardware and parts as well as partially assembled on line systems

3 Leases.

Lessee The company leases its office space on terms ranging from three to ten years. Automotive equipment is leased for three years. The Company also leases computer equipment with the majority being leased over a period of five years. The balance of the leased computer equipment is on two year and seven year terms. All of the above leases are classified as operating leases and the rental expense was $2 056 000 in 1982 and $1 024 000 in 1981

Minimum rental commitments under these leases as of December 31 1982 are as follows (in thousands)

YEAR ENDING	TOTALS
December 31 1983	$2 383
December 31 1984	2 263
December 31 1985	1 539
December 31 1986	1 711
December 31 1987	1 377

There are no future rental commitments past 1993

Lessor The Company leased computer equipment to customers with terms ranging from one to five years. At December 31 1982 all of these leases had been terminated. The Company now provides for equipment leasing through its wholly owned non consolidated subsidiary U S Computer Systems Leasing (see Note 4)

4 Investment in and Advances from Non-Consolidated Leasing Subsidiary

In September of 1981 the Company formed U S Computer Systems Leasing (D B A CableLease) a wholly owned non consolidated subsidiary. CableLease purchases computer equipment from the Company which it then leases to third parties on a direct financing lease arrangement. CableLease retains a management company to assist in its leasing operation. Summarized financial information of CableLease for the periods ended December 31 1982 and 1981 is as follows

BALANCE SHEET
(in thousands)

Assets.	1982	1981
Cash	$ (20)	$ 32
Net investment in direct finance leases		
Total minimum lease payments receivable		
less unearned income of $3 592 in 1982 and $822 in 1981	5 921	1 653
Due from parent company	295	78
Equipment	215	322
Other assets	82	2
TOTAL ASSETS	$ 6 493	$ 2 087
Liabilities and Stockholder s Equity		
Accounts payable		$ 322
Payable to parent company on purchase of computer equipment	3 086	803
Other payables	90	35
Notes payable (collateralized by leased computer equipment)	2 986	625
Stockholder s equity	329	302
TOTAL LIABILITIES AND STOCKHOLDER S EQUITY	$ 6 493	$ 2 087

4 Investment in and Advances from Non-Consolidated Leasing Subsidiary (Continued)

STATEMENT OF INCOME
(in thousands)

	1982	1981
Revenue	$ 520	$ 56
Management fee expense	680	157
Interest expense	303	9
Other expenses	110	
Income (loss) before income taxes	(573)	(110)
Provision for income tax benefits	600	162
Net income	$ 27	$ 52

Investment in and advances from non consolidated subsidiary at December 31 1982 and 1981 is comprised of (in thousands)

	1982	1981
Capital stock and contribution to capital	$ 250	$ 250
Undistributed Earnings	79	52
Income tax benefits	(601)	(162)
Cash advances to subsidiary	306	84
	$ 34	$ 224

Investment income (loss) from non consolidated subsidiary in the Company's statement of income represents CableLease's income (loss) before provision for income tax benefits

5 Notes Receivable:

The notes receivable are due from employees and officers of the corporation. A portion of the notes, $94 000 at December 31 1982 and $168 000 at December 31 1981, are without interest and the remainder have interest rates of 6 0% and 10 0%. The notes are due on demand, with no specific terms, are unsecured and include accrued interest

6 Employee Stock Ownership Plans:

The Company has two defined contribution stock ownership plans covering substantially all of its employees. The plans are funded by annual contributions from the Company deposited with the trustees. The expense was $704 000 in 1982 and $244 000 in 1981. Shares of stock contributed in previous years are held in trust for the benefit of the participants

7 Revolving Credit Notes

The Company entered into agreements with two banks during 1982 for revolving credit notes totaling $20 000 000. Under the terms of the agreements the total line becomes available in increments based on certain milestones relative to the development and testing of the Company's new Home Terminal Unit product

At December 31 1982 $7 500 000 was outstanding against an available $8 000 000. These loans bear interest at prime plus 1 0% payable monthly. A commitment fee of .50% per annum is payable on the unused portion of the revolving credit notes. Any balances outstanding at September 1 1984 will convert to term loans maturing in 20 quarterly installments commencing on January 1 1985. The term loan will bear interest at prime plus 1 0%

On October 13 1982 the Company used proceeds of the new revolving credit notes to retire an annual credit line and a revolving credit line with one of the banks. At December 31 1981 the outstanding balance was $3 000 000 on the annual credit line bearing interest at prime plus 1 0% and $2 400 000 on the revolving credit line bearing interest at prime plus 2 0%

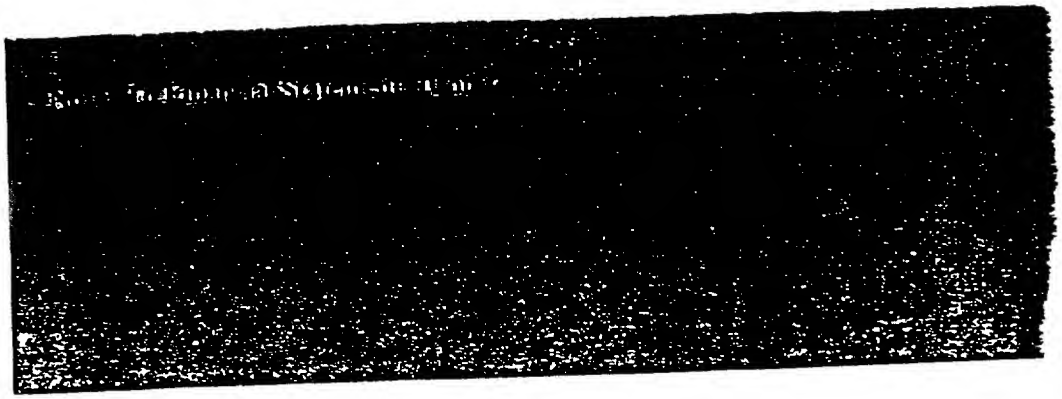
The lines are collateralized by accounts receivable, inventory, property and equipment, and key man life insurance policies

The agreement provisions limit, without prior written consent, among other things, declarations of cash dividends, sales of assets or stock, capital expenditures and acquisition of indebtedness and subsidiaries. There are also covenants relating to cash flow and debt to worth ratios

8. Long-Term Debt.

Long term debt at December 31, including current maturity, consists of the following (in thousands)

		1982		1981	
	INTEREST RATE	CURRENT	AFTER ONE YEAR	CURRENT	AFTER ONE YEAR
Notes payable Wells Fargo Leasing Corp collateralized by certain equipment	12 75%	$61	$ 18	$61	$79
Less unamortized interest		5	-	11	5
Net		56	18	50	74
Notes payable unsecured	9 25%	26	100	24	126
Totals		$82	$118	$74	$200



The principal amounts borrowed from Wells Fargo Leasing are payable in 60 monthly payments through 1984

The unsecured notes payable were issued for a prior year's redemption and retirement of 40 000 shares of voting common stock at $7.95 per share. These notes are payable in annual installments to 1986

The aggregate maturity of long term debt including the term loans (see Note 7) over the next five years is as follows (in thousands)

YEAR ENDING	AMOUNT
December 31 1983	$ 82
December 31 1984	52
December 31 1985	1 081
December 31 1986	1 535
December 31 1987	1 500

9 Product Development Expense

The Company is actively engaged in research and development programs designed to develop new or improved products. Historically this has been limited to software designed to operate on computers sold or leased by the Company. In 1981 the Company began development of an addressable converter for use by cable systems. The cost of all research and development expensed as incurred was $1 535 000 in 1982 and $336 000 in 1981

10 Income Tax Expense

The composition of income tax expense is as follows (in thousands)

	1982	1981
Current		
Federal	$ 634	$1 537
State	316	425
	950	1 962
Deferred		
Federal	621	340
State	121	65
	742	405
Totals	$1 692	$2 367

The Company's effective tax rate differs from the statutory U.S. Federal income tax rate as follows

	1982	1981
Federal statutory rate	46.0	46.0%
Federal tax rate differential	(.1)	1.4
Federal investment tax credits	(16.3)	(6.3)
Federal research and development tax credit	(3.5)	(1.3)
State income taxes net of federal benefit	5.0	4.8
Other	2	3
Effective Tax Rate	31.0%	43.1%

11 Commitments

The Company entered into stock [illegible] January 1981 with two stockholders. The redemption of their 46 259 shares of voting common stock is to [illegible] year period at an agreed upon price based on the appraised value of the Company's stock used in the [illegible] to the Employee Stock Ownership Plans at the redemption dates. The Company redeemed [illegible] years ended December 31 1982 and 1981. The appraised value used was $45.00 per share in 1982 totaling $[illegible] 1981 totaling $416 000

12 Account Reclassifications

Account reclassifications of [illegible] 1981 have been made to conform to the financial statement presentation [illegible] 1982. Such reclassifications [illegible]

The Company receives advance [illegible] customers to offset postage costs at the time the customers' statements are mailed. In prior years postage [illegible] under other accrued expenses. To more accurately reflect the Company's financial position, postage deposits are [illegible] receivable

Accountants' Report

To The Board of Directors and Stockholders
U S COMPUTER SYSTEMS (D/B/A CableData)
Sacramento California

We have examined the balance sheets of U S COMPUTER SYSTEMS (D B A CableData) as of December 31 1982 and 1981 and the related statements of income changes in stockholders equity and changes in financial position for the years then ended Our examinations were made in accordance with generally accepted auditing standards and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances

In our opinion the financial statements referred to above present fairly the financial position of U S COMPUTER SYSTEMS (D B A CableData) as of December 31 1982 and 1981 and the results of its operations and the changes in its financial position for the years then ended in conformity with generally accepted accounting principles applied on a consistent basis

Coopers & Lybrand
S. J. Gallina & Co.

Coopers & Lybrand
and
S J Gallina & Co
Sacramento California
March 9 1983

Left to Right: Gerald S. Knapp, Donald L. Courtright, Robert J. Mathews, Richard L. Thurn, and David E. Barnes

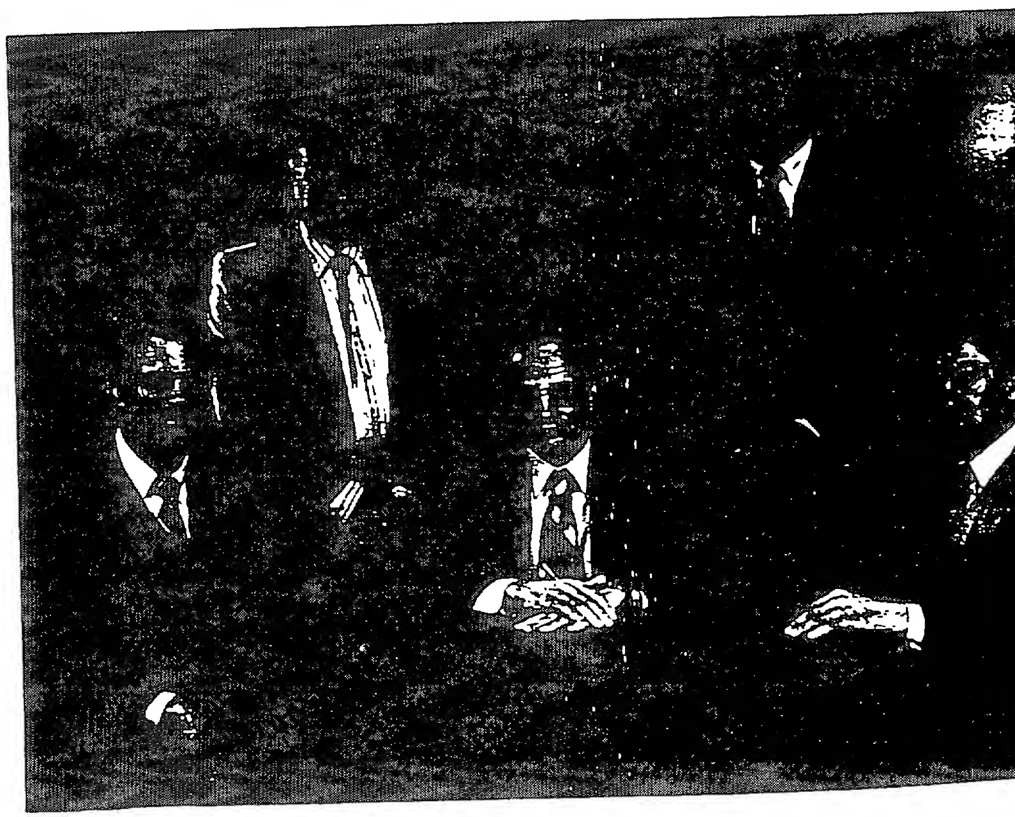
Robert J Mathews
President U S Computer Systems
Chairman of the Board

David E Barnes
Executive Vice President
U S Computer Systems

Gerald S. Knapp
Vice President of Finance
U S Computer Systems

Richard L. Thurn
Member Gray and Thurn Inc

Donald L. Courtright
Independent Investor



This annual report was entirely written and produced by CableData's Marketing Department and Printing/Graphics Department.
Writing and Design . . Joan Levers

cable data
3200 Arden Way
Sacramento, CA 95825
(916) 485-2911

February 22, 1985

Mr. Semir Sirazi
CATV Division
Zenith Electronics Corp.
1000 N. Milwaukee Avenue
Glenview, IL 60026

Dear Mr. Sirazi:

As part of Viacom's pay-per-view project efforts, we have defined the functional requirements for an ANI-based automated order entry system for telephone order entry on a one-way addressable system. We have assumed the use of a Pac Bell ANI passing scheme used in conjunction with a Zenith one-way addressable system, a Zenith provided control computer and a CableData subscriber management system.

While these requirements represent our best understanding of how a system should work, we would like to initiate a dialogue with you to enhance our mutual understanding of the options available to us and the cost and schedule impact of each option.

Don't hesitate to call me or Mike Johnson if you have any questions. We will be in contact with you by March 8th regarding further discussions.

We are looking forward to implementing with you this new and technically superior solution to the order entry problem. We feel we are developing together the key to a significant new revenue stream.

Sincerely,

Douglas Semon
Director of Engineering,
New Technology Development

DS:ms

cc: James Faust
Mike Johnson

Viacom Cable P.O. Box 13, Pleasanton, CA 94566-0811 Tel. (415) 828-8510

PAY PER VIEW

AUTOMATIC NUMER IDENTIFICATION

FUNCTIONAL SPECIFICATIONS

ANI (System)

The system must:

1. Accept an impulse buy from the customer - (multiple numbers) at least four events per day.
2. Capture and transmit the following:
   . Calling number
   . Called number
   . Time and date of call
3. Transmit data over private data circuits (1200 baud) to a control computer.
4. Be able to accept a positive and negative acknowledgment from the control computer.
5. Be able to confirm or reject order to customer via "Thank you" or "Rejected" messages.
6. Complete the transaction to the customer in less than 5 seconds from answer to acknowledgment (assuming timely response from the control computer).
7. Be able to accept rotary dialed calls.
8. Not block customer calls more than 1 percent of the time.
9. Not cost more than $.25 per transaction.
10. Not charge rejected calls.
11. Not reflect charges on the customer's phone bill.

FUNCTIONAL SPECIFICATIONS

ZENITH (Control Computer):

The control computer must:

1. Receive call data from the ANI computer.

2. Be able to capture, record, and report:

   . Calling number

   . Called number

   . Date and time

3. Accept file from Subscriber Management Computer

   . Home phone # field

   . Box number(s) (multi outlets?)

4. Maintain an event file

   . From the Subscriber Management computer

   . Convert called number to event number

   . Convert calling number to box number

5. Send acknowledgment through the data line to the ANI computer in a timely manner.

   . ACK = Thank you

   . NAK = Reject

6. Upload to subscriber Mgmt. computer transactions for billing

   . Calling number

   . Event ID (time, date)

   . Box number

7. Control boxes and encoders.

   . Authorize event as order is received

   . Deauthorize all units after event is over

   . Re-tag encoders for each different event

   . Maintain a mini global for fast refresh

FUNCTIONAL SPECIFICATIONS

CABLEDATA (Subscriber Management Computer)

The Subscriber Management Computer must:

(1) Be able to download to the control computer a potential customer file on at least a daily basis.

- Phone number
- Box number

(2) Download an event file (as required).

(3) Pass pre-buy orders through to Zenith control computer.

(4) Be able to accept completed transactions (upload)

- Calling number
- Event ID (time, date)
- Box number

(5) Post and Bill

(6) Provide PPV Reporting

- Marketing
- Financials

May 21, 1985

Donna Brickell
Project Manager
Pacific Bell
444 Market Street, Room 1210
San Francisco, CA 94111

Dear Donna:

Enclosed is the revised edition of the draft letter of intent for the ANI/IPPV test project. In addition to the clarifications you requested, we have included a few other points. Please review and contact me if there are any problems or questions.

Following your review of this draft, I understand that the Pacific Bell Legal Department will put together a formal letter of intent. When that document is finalized, please forward two signed copies to my attention. I will then route to the appropriate Viacom personnel for final review and signature.

Sincerely,

VIACOM CABLE

Andrew Paff
Manager, New Business Development

AP:kk
encl.

Viacom Cable P.O. Box 13, Pleasanton, CA 94566-0811 Tel. (415) 828-8510

*****DRAFT*****

MEMORANDUM OF UNDERSTANDING
FOR FIELD TEST OF
IMPULSE PAY-PER-VIEW SERVICE

Description of Service

This Field Test is proposed in order to evaluate Pacific Bell's Automatic Number Identification (ANI) order entry system for possible use in Viacom Cable's Impulse Pay-Per-View (PPV) service.

The ANI system will enable a Viacom cable subscriber to order individual PPV events through the following scenario:

> The subscriber dials a local telephone number corresponding to a unique PPV event.
>
> The calling number (location of converter to be authorized) and the number called (desired PPV event) will be forwarded to Viacom over dedicated data lines.
>
> Viacom owned computer equipment will validate the request and authorize the PPV event for the converter assigned to the calling number. Viacom's computer logs the transaction at this time for subsequent upload to Viacom's billing system.
>
> The subscriber will receive a recorded voice confirmation from Pacific Bell.

Scope of Agreement

I. Role of Participants:

Pacific Bell

Pacific Bell will install a Pacific Bell Services Node (PBSN) and Communications Controller in the San Ramon Central Office (SNRM11). Intra-office trunking and PBSN line capacity will be sized to meet the projected peak PPV volume in the San Ramon Serving Area. The PBSN will have capability to deliver multiple, simultaneous 8-10 second digital voice announcements and the facilities to enable Viacom to remotely update these announcements though a private phone line. Pacific Bell will reserve a block of phone numbers to enable Viacom to process multiple PPV events.

Pacific Bell will provide two 1200 baud data lines (one for redundancy) between the PBSN and Viacom's headend control computer for delivery of the ANI (event and authorization location) information. The control computer will be located at Viacom Cablevision offices on Sierra Lane in Dublin. In order to implement error free communication between the PBSN and the control computer, Pacific Bell will coordinate the interface specifications with Zenith Electronics, Viacom's primary supplier of addressable equipment in the San Ramon area.

Draft
May 21, 1985
Page Two

For the purpose of this Field Test, Pacific Bell will make the ANI service available to the 6,100 Viacom addressable cable subscribers within the San Ramon Central Office Area (see attached map). All rotary and touchtone phones within this service area will be able to access this service. All incoming calls from outside this service area will be blocked.

Viacom

Viacom will provide for the purpose of the Tests, all hardware and software associated with the operation of a one-way addressable cable system. This includes a program channel, its scrambler, an addressable control computer, and sufficient decoder locations to effectively evaluate the ANI technology. All space and facilities necessary to house this will be provided by Viacom.

Viacom will coordinate with CableData, its supplier of billing hardware and software, all aspects of the interface between the control computer and the billing system in order to extract the pertinent order information from the control computer for billing purposes. Additionally, the CableData billing system is capable of maintaining some statistics concerning the ordering of events. Viacom will make these statistics available to Pacific Bell. In doing so, however, no guarantee is made that these statistics will be sufficient to fully determine the suitablility of the ANI system. Viacom understands that Pacific Bell will be able to gather statistics concerning the loading of the telephone network, as pertains to the ANI test. Pacific Bell will make such statistics available to Viacom.

Pacific Bell and Viacom will notify each other of equipment problems through established procedures. Single points of contact will be identified in both companies to coordinate troubleshooting and related service activities.

II. Purpose of Test:

Pacific Bell

Pacific Bell will evaluate the performance of its Automatic Number Identification system in conjunction with a cable television headend control and billing interface PPV system. The test will provide the opportunity to evaluate the hardware and software of all related systems under various operational conditions. Particular areas of interest include load capacities, traffic data patterns, holding times, and interface specifications. Established provisioning and maintenance procedures will also be evaluated.

This test will also provide an opportunity to implement and evaluate new features for the ANI order entry system. The Pacific Bell Technology Assessment Labs will investigate enhancements on the system prototype. Implementation of these enhancements during the Field Test will be subject to the concurrence of all concerned parties.

Draft
May 21, 1985
Page Three

This test will provide some unique research opportunities. Pacific Bell will contract with a research firm to conduct market research during the test. This research will be directed at customer perception of PPV services in general and customer acceptance of the order-entry system.

Pacific Bell will also utilize this test to showcase the ANI system. However, all press releases, access to test results, and subsequent advertising will be subject to the consent of both parties.

Viacom

Viacom will evaluate the technical and economic viability of the ANI system as the order fulfillment mechanism for its Impulse Pay-Per-View service. Viacom's technical interests are similar to Pacific Bell's as detailed above. Economic test objectives will involve analysis of relative capital and operating costs, PPV penetration levels, and overall impact on operations vis-à-vis alternative fulfillment mechanisms.

III. Procedure:

Alpha Test

The Alpha Test will involve interface of the ANI unit to the Viacom headend control systems. The purpose of the test is to insure that the ANI device and the control computer can act together in such a manner as to allow the ordering of a PPV event, resulting in the authorization of the PPV decoders. The order fulfillment process should be demonstrated to be quick and reliable for this test to be deemed a success.

The interface to the CableData billing system is not required at this point. However, if it is available, we may choose to interconnect with it at this time.

The target date for accomplishing this in a laboratory or simulated environment is June 15, 1985.

Beta Test

The ANI unit will be installed at the San Ramon Central Office by August 5, 1985, subject to equipment availability from the manufacturer. This first phase of the Beta Test will be completed when the hardware/software interface between ANI and the Viacom headend control and billing systems is proven satisfactory in the this field environment.

Upon completion of the first phase of the Beta Test, between 25 and 100 selected participants will begin using the system for PPV event order entry. Viacom envisions that these participants will be employees of Viacom or Pacific Bell, and will not be from the general public.

The Beta Test will be complete upon the mutual agreement of Pacific Bell and Viacom.

Ninety Day Trial

Upon completion of the Beta Test, cable television subscribers in the test area will be phased into the Field Test in weekly increments of 500 to full implementation.

This phase will be complete ninety days from the end of the Beta Test.

Termination / Extension

The Field Test may be cancelled at any time by either Viacom or Pacific Bell upon a thirty day written notice. The Field Test may be extended or expanded beyond the present scope of this document by mutual consent of Viacom and Pacific Bell.

IV. Field Test Costs:

Pacific Bell will provide the ANI service to Viacom as described in Section I of this document at no cost during the Field Test (alpha through 90 day trial).

Upon successful completion of the Field Test, Pacific Bell agrees to continue to offer the ANI service to Viacom as described in Section I on a contract basis until a commercial product is made available. Expansion to regions beyond the initial test area is subject to constraints in the Modified Final Judgment regarding the RFP process.

V. Other Considerations:

Viacom will insure that its customers in the test area understand that Pacific Bell is forwarding phone numbers for order entry. These customers will be given the right, in writing, to remove their phone number from the ANI order entry system.

Pacific Bell and Viacom understand that this is a test and that potential customers may be lost due to system failure. Both parties realize that customer complaints might increase.

The hardware and software used in conjunction with the Field Test is not to be construed as the final architecture. Ultimate equipment provisioning is subject to the RFP process, evaluating all vendor proposals. Specific proprietary information regarding the hardware used will not be disclosed in order to protect the pending patent and insure impartial response to the RFP.

Pacific Bell reserves the right to choke calls to the ANI system to protect the telephone system for emergency services.

Pacific Bell will not be held liable in any legal suits filed against Viacom in conjunction with the content of the program delivered over the cable television network.

Viacom is aware that Pacific Bell has support of its legal department regarding the legality of the ANI service. If the service is challenged in the courts as an enhanced or information service, the field test might be delayed.

Implementation of the Field Test is subject to the approval of the Business Case by Marketing Board on May 28, 1985.

Pacific Bell understands that Viacom Cable is evaluating several order fulfillment mechanisms for its PPV service in addition to ANI and that there is no commitment to Pacific Bell at this time, implied or otherwise, beyond the scope of this document.

VI. Nondisclosure:

Viacom and Pacific Bell understand the sensitive nature of this project and agree to regard all aspects of the Field Test as confidential. Any external communication regarding this project (i.e. outside authorized representatives of Viacom, Pacific Bell, and third party participants) will require the consent of Viacom, Pacific Bell, and relevant third party participant.

1986 CONVENTION TECHNICAL PROGRAM SUBCOMMITTEE

Mr. Wendell H. Bailey, Chairman
National Cable Television Association

Dr. Walter S. Ciciora
American Television & Communications Corporation

Mr. Al Kernes
Jones Intercable, Inc.

Dr. Jeffrey Krauss
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A TRIAL OF A NATIONAL PAY-PER-VIEW ORDERING AND BILLING SYSTEM

Andrew F. Bulfer, AT&T Communications

Matthew D. Miller, Viacom International

Nancy Frank, CableData

ABSTRACT

A new concept in fully automated pay-per-view ordering and billing is presented. The system has the potential for nationwide scope, very high impulse capacity, and easy implementation by the cable operator. It would be simple and easy for the cable subscriber to use and would have low initial cost. It features a direct interface with the cable company's billing system so that all the elements of the pay-per-view transaction are handled in a fully integrated manner. A trial is planned in Milwaukee, Wisconsin starting in June, 1986.

INTRODUCTION

On December 5, 1985, AT&T, Showtime/The Movie Channel, Viacom Cable, and CableData announced they will participate jointly in a concept trial of an automated impulse pay-per-view ordering service that will allow cable television customers to order premium pay-per-view programming on a nationwide basis. The nine month trial is scheduled to begin in June, 1986 at a Viacom cable system in Milwaukee, Wisconsin.

There are four elements which must be performed in a successful impulse pay-per-view transaction:

1. Order Entry;
2. Event Scheduling (converter authorization/de-authorization);
3. Program Delivery;
4. Billing.

Because order entry is such an obvious problem, much attention has been focused on it, perhaps distracting attention from the other elements of the pay-per-view transaction. It is the goal of the Milwaukee trial to demonstrate a *system* in which all of the elements are handled in an integrated, fully-automated fashion and which is capable of accommodating a heavy volume of impulse orders. The system has the potential to be nationwide in scope, easily implemented by the cable operator, and cost-effective.

The order entry technology will be furnished by AT&T and will be based on an integration of three elements: AT&T 800 Service which allows consumers to place toll-free orders; mass announcement systems installed within the AT&T public switched network to enable quick verbal acknowledgement with very high capacity; and Automatic Number Identification (ANI) which captures the caller's telephone number and passes it to the order processing system. The order processing system will be provided by CableData and will feature an automated interface between the ANI data stream from the AT&T network and the CableData business system as well as an event scheduling and billing package. Viewer's Choice, Showtime's pay-per-view programming service, will provide programming via an encrypted national satellite feed. The combination of these components will form a complete end-to-end pay-per-view system.

This paper presents details of the Milwaukee trial, including a description of the entire transaction flow starting with the cable subscriber's telephone call and concluding with the receipt of an accurate, auditable bill.

WHY A NATIONAL SERVICE?

The Milwaukee trial will test a system concept with national scope. Specifically, the AT&T order entry technology is based on the nationwide AT&T public switched network which can be accessed from any telephone in the country including both rotary and Touchtone® telephones. The ANI information is delivered to the cable company using standard communications protocols, and the programming is delivered by a national satellite feed. Why have the trial participants chosen this approach?

The authors believe strongly in the merits of a readily implemented, cost-effective, turnkey ordering system with national scope and very simple customer interface. Such a system could be sponsored by a national pay-per-view distributor such as Viewer's Choice and would have advantages of scale which can minimize the economic and opera-

tional hardship inflicted on any individual cable system that wishes to offer its subsribers pay-per-view programming. This arrangement would encourage the growth of the entire pay-per-view industry and benefit all industry participants including studios, programmers, cable operators, and vendors to the cable industry.

A national order entry system would help to build the pay-per-view audience more rapidly by making ordering simple, uniform, and widely understood by consumers. Furthermore, such a system would make it possible to utilize nationwide marketing techniques, which have lower costs per thousand and can be more directly integrated with the programming, but which are not useful when potential audiences are small. A standardized interface to the cable operator's business system would greatly reduce software development time and expense. In addition, since many business management systems already interface with the addressable controller, the time, cost, and difficulty of event scheduling should be reduced.

Many of these benefits would flow directly to the operator as reduced cost and difficulty. Others, like marketing efficiency and greater customer understanding and ease of use, should result in revenue increases from higher buying rates.

A streamlined national transaction management system would offer benefits not only to industry participants but also, equally importantly, to subscribers. Reduced cost and simplified ordering could support a healthy industry, capable of providing a diversity of pay-per-view programming in a cost-effective way to a substantial audience.

REQUIEMENTS OF A NATIONAL ORDERING SYSTEM

In the authors' view, a national pay-per-view order entry system must satisfy five general requirements:

1. Very High Impulse Capacity;
2. Simple And Easy To Use;
3. Economical With Low Initial Cost;
4. Direct Interface With The Cable Company's Billing Computer;
5. Turnkey The Cable Operator.

The rationale for these requirements is described below.

High Impulse Capacity. Market research has consistently shown and experience has proven that consumers wish to wait to order until the last moment before a show and will do so if left on their own. Indeed, for marketing reasons, this behavior is to be encouraged in order to benefit from impulsive consumer buying decisions. However, impulse buying makes extraordinary demands on the order entry system. A good system must have sufficient capacity to handle the traffic when all the orders for a routine movie arrive within the last few minutes before the movie begins.

Simple And Easy To Use. The consumer interface must be extremely simple, easy to understand, and natural to use. This, again, will allow consumers to make last minute buying decisions and then implement their decision without being inhibited, intimidated, or foiled by the ordering system.

Economical With Low Initial Costs. That the system must be economical should go without saying in a relatively low margin business such as pay-per-view. Moreover, a system with low initial cost will allow operators to experiment with pay-per-view with minimal risk.

Direct Interface With The Cable Company's Billing Computer. This is a requirement of an overall pay-per-view transaction processing system that is all too often ignored. In addition to enabling fully automated handling of pay-per-view transactions from beginning to end, it will allow sophisticated on-line error and validity checking that will maximize security and minimize customer service problems.

Turnkey To The Cable Operator. A standard overall system that can be simply installed and operated by the cable operator is extremely important. Not only will it encourage more rapid adoption of pay-per-view throughout the cable industry, it will also gain advantages of scale by allowing hardware and software development to be done once nationwide with concomitant cost economies.

CONCEPTUAL OUTLINE OF A NATIONAL ORDERING SYSTEM

Based on the above requirements, a national ordering system could take the following form:

1. The ordering system would be built around AT&T Advanced 800 Service. Each movie or event that may be ordered would be assigned a unique toll-free 800 number. To order, the customer would dial this number.

2. An automated acknowledging announcement would be given by a mass announcement node inside the AT&T public switched network so that massive impulse capacity could be available. No 800 service lines to the sponsor's premises — which have led to traffic choking and limited capacity in the past — would be required.

3. ANI would be delivered to a national pay-per-view distributor such as Viewer's Choice. Economic distribution of the ANI information to the cable operator could be handled via a data subchannel on the satellite feed.

4. Fully automatic processing, validation of the order, and activation of the addressable system could be achieved by interfacing the ANI data stream from the satellite receiver directly to the cable company's billing processor.

The start-up costs for a cable operator to offer pay-per-view with such a system would be minimal. There would be no capital or installation expense in the subscriber's home since the system would be implemented with hardware already there: the addressable converter for program reception and the telephone for order entry.

THE MILWAUKEE TRIAL

In an attempt to determine the value and operational characteristics of a national system, AT&T, Viacom, and Showtime/The Movie Channel, have entered into an agreement to do a small scale trial of such a system. In the trial, Showtime will provide the pay-per-view product via its Viewer's Choice service, Viacom will furnish the trial cable system, and AT&T will assemble a small scale, localized version of a national ordering system. In the trial, CableData has agreed to provide the processing of the ANI, the interface with the billing system, and the activation of the addressable system.

Trial Location

The trial will take place at Viacom Cablevision Of Milwaukee, a 36,000 subscriber Viacom system serving fourteen suburban communities in the Milwaukee area. The system has 108 channels of which over 60 are currently activated. Every subscriber has an addressable converter and will have access to the pay-per-view service in the trial. The system uses Zenith Z-TAC one-way addressable equipment.

This site was chosen for a number of reasons including: the demographics of its subscribers are typical of cable subscribers nationwide, every basic subscriber has an addressable converter, the system is of manageable size, it is served by CableData's billing system, every local telephone company central office will be capable of transferring ANI by the time of the trial, and AT&T will have the necessary network features installed in its Waukeesha, Wisconsin No. 4 ESS toll switching office, which serves the Milwaukee area.

Trial Objectives

The objectives of the trial are to gather information on the value and performance of this type of fully automated, potentially nationwide, ordering/billing system in a live pay-per-view environment and to identify issues associated with its use. There are five categories of information desired:

Consumer Reactions. This includes finding out how consumers like ordering pay-per-view movies and events using the system, whether they can use it effectively, the type and quantity of errors they make, the type and quantity of customer service problems that result, and whether changes in the system are required to ameliorate the effects of these errors.

Marketing Issues. These include determining the type of consumer education required, if any, a quantification of the frequency of use, and an evaluation of the marketing value of the system.

Technical Problems. These include identification and solution of any unexpected interface problems and the quantification of error rates, speed, time delays, and other measures of overall performance of the entire system and its components under conditions of real consumer usage.

Operations Problems. These include problems that may occur in operating the ordering system from both a cable company, service sponsor, billing vendor and AT&T perspective.

Billing Issues. One of the important objectives of the trial is to identify problems and issues associated with the automated interface to the billing system and, more generally, with the process of billing and collection for pay-per-view movies and events.

Trial Schedule

The trial is scheduled to commence in June, 1986 and to terminate in March, 1987, nine months later. Since the trial is primarily a marketing trial, it must run long enough for consumers to learn to use it and become comfortable with it — hence nine months. The start date was determined by technical hardware and software availability within the AT&T network.

Trial Architecture

The trial architecture is shown in Figure 1. The Viewer's Choice pay-per-view programming feed originates at the Showtime satellite uplink facility in Hauppauge, Long Island, and is beamed to the trial site via Transponder T5 on Satcom 3R. Customer's telephone orders will be handled within the AT&T public switched network using a modified version of 800 Service. The calling telephone numbers will be passed to Viacom's CableData Tandem computer system in Cleveland which will perform a number of validity checks, identify the callers that ordered, and transmit the appropriate data back to the addressable system controller in Milwaukee to enable descrambling in the customers' addressable converters.

Trial Order Entry

A description of the order entry process for the trial is as follows:

1. Each pay-per-view channel available will have a toll-free 800 area code telephone number associated with it. Current plans envision two such channels with the two numbers: 1-800-VIEWER1 and 1-800-VIEWER2. To order a pay-per-view movie or event, the cable subscriber simply dials the ordering telephone number for that channel. The caller may utilize a telephone with either Touchtone or dial-pulse signaling. However, the consumer must dial from his or her own home or from a telephone known to the local cable company.

2. The call is routed, as are all 800 calls, by the local telephone company to AT&T's network. AT&T obtains the caller's telephone number automatically by Automatic Number Identification from the local telephone company's central office under the terms of equal access.

3. The call is routed to AT&T's Cleveland switching office where, by an arrangement of trunks within the switching equipment, it terminates at an existing AT&T mass announcement facility. Here, answer supervision is returned, and a "thank you" announcement is given to the caller acknowledging that the order has been placed. When the caller hears the announcement, he or she either hangs up or the announcement facility disconnects the call when the announcement is completed.

4. AT&T passes the calling and called number (indicating the channel which carries the movie or event that the customer wants) to the CableData computer in Cleveland over a dedicated private data line in a standard data protocol.

5. The CableData computer, a Tandem Non-Stop system, contains an on-line database of the cable company's subscribers' telephone numbers. The processor performs a number of validity checks or "edits" including:

- That the customer's telephone number exists in the database;
- That the customer's home is equipped with addressable outlets capable of handling pay-per-view;
- That the customer's account is active;
- That the customer is not in collections;
- Whether ordering the event will not put the customer beyond their credit limit;
- Which outlet in the home to authorize.

Those orders not qualifying for pay-per-view service will be noted automatically by CableData's DDP software. A phone call to that customer, informing them that their order cannot be accepted, can be placed either automatically by DDP software through the Tandem computer and Programmable Auto Dialer (PAD), or manually by customer service representatives using a report generated by DDP. The cable company may choose to pursue these as future customers, candidates for addressable converter installation, or to motivate payment of an overdue bill.

7. The Tandem processor in Cleveland then passes the consumer's identity to the addressable system controller in Milwaukee through an automated interface via a network of private data lines. At or before the start of the program, descrambling is activated in the subscriber's addressable converter.

8. Counts of the number of orders for each program will be available to the pay-per-view program distributor and other authorized recipients within minutes of their being placed.

9. The charges for the pay-per-view program will appear on the cable subscriber's monthly cable bill prepared and rendered by CableData.

Trial Capacity

The capacity of the trial system has been designed to be able to handle any impulse load that can reasonably be expected. Since the system is composed of a sequence of processing steps, the ultimate capacity will be determined by the capacity of the slowest component. An analysis of the capacity of each step is as follows:

AT&T Public Switched Network Capacity. The AT&T network will be configured to handle up to several hundred calls per minute in the trial depending on the call holding time. This is determined by the trunking arrangement in the Cleveland switching office. The local telephone company central offices, the AT&T switching offices involved in the calls, and the mass announcement system have far greater capacity and so are not expected to be a limitation. Since the calls themselves have no egress from the AT&T network, no 800 service lines to the sponsor's premises, which have traditionally been the bottleneck in telephone-based systems, will be required.

CableData Capacity. CableData's DDP information and billing system, using a Tandem Non-Stop computer, will provide rapid processing of: 1) all calls received from AT&T, and 2) commands sent to the addressable controller authorizing those converters qualifying for the pay-per-view service ordered. This is accomplished by prioritizing both the verification edits and box authorization commands occurring between memory and disk, maximizing the hardware capabilities of the Tandem through use of CableData's DDP software. The exact capacity of this configuration will be determined by benchmark tests prior to the trial. However, it is expected to be more than sufficient to process the anticipated traffic.

Addressable System Capacity. The current Zenith system installed in Milwaukee uses a Zenith-provided Intel addressing processor whose capacity is 1200 to 1800 calls per hour. This is expected to be the limiting system factor. Viacom is considering replacing this processor with an HP1000 minicomputer whose capacity will far exceed that of the Intel processor.

The system is designed to be graceful under overload, should it occur. If calls arrive at such a high rate that the trunks in the Cleveland switching office are overloaded, callers will hear a standard reorder tone ("fast busy"). The other system components are all designed to buffer information that cannot be immediately processed so that, under overload conditions, orders are simply delayed, not lost.

CONCLUSIONS

The nationwide service concept described above is in the study stage and has not been committed for nationwide deployment. But, if the trial results are positive and it is determined that a service offering of this type would be useful and valuable, then it is likely that a nationwide service would be offered.

If it were to be deployed, the AT&T portion would be available under tariff or other appropriate regulatory structure to anyone. It is likely that it would be purchased by national pay-per-view distributors such as Viewer's Choice who would offer the service to its own affiliates. Likewise, CableData, as a supplier to the cable Industry, expects to make any software or hardware developed as a result of the trial available to all of its customers.

The pay-per-view transaction system described in this paper has the potential to satisfy the most important requirements of ordering and billing:

- Nationwide Scope;
- Very High Capacity;
- Ease And Simplicity To Ensure Customer Acceptance;
- Low Up-Front Costs;
- Full Automation Including Billing;
- Turnkey Installation And Operation.

The partners in the trial, AT&T, Showtime, and Viacom, together with CableData believe that they have an important concept for the fundamental health and growth of the pay-per-view industry.

Figure 1 on followng page

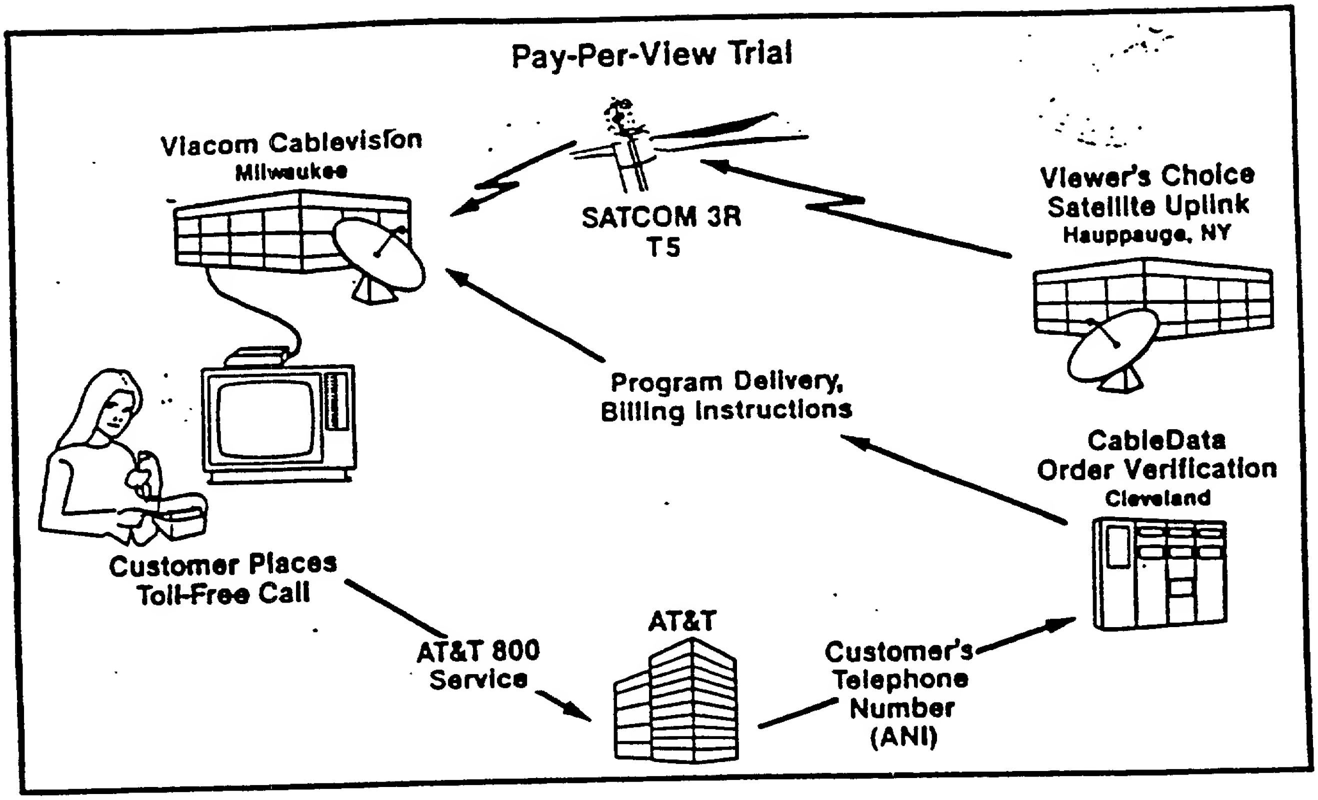


Figure 1 — Trial Architecture

VIACOM CABLE - MEMO

TO: DISTRIBUTION

FROM: LORETTA ZARZA/DOUG SEMON

DATE: MAY 30, 1986

SUBJ: PPV/ANI

Attached you will find the procedures for establishing Pay Per View orderable via ANI.

Both Zenith and ARU documentation is attached.

LZ/DS:ms
Att.

Distribution:

Linda Cozart
Paul Galinas
Myrt Jones
Bruce Schlessinger
Paul Sheleg

INITIAL SETUP FOR 1ST UPLOAD ONLY

A. 1. HP-1000 - Verify that all events are removed. Remove future and past events from IPPV schedule.

B. 2. Run the HP global de-authorization on all PPV events.

C. 3. Upload transaction file - HP-1000 purge transaction file (purge prior to upload for 1st run only).

4. Record ARU - cancel message.

PPV-ANI PROCEDURES

1. Add the event to the CableData event table (Director File).

   Option 19 - PPV

   Sub option 1 - Event Table

2. HP program scheduler - add the program (Event #)

   The program name will always equal the CableData event number.

   The Event chanel must be entered (see HP documentation) page 17, #5.

3. HP add program - Refer to the event calendar for tag numbers. (Buy and cancel tag.)

   (Program ID = equals CableData Event #)

   (Program Tag = autho code A1 thru D5)

   Chanel = Viewer's choice 14

   Giantvision 1

   Buy event - Viewer's choice 10 (833-2100)

   Giantvision 0

   Cancel event = Viewer's choice 12 (833-2125)

   Giantvision 0

The 5th and 6th numbr of the phone number are for showings ordred via ANI only. If this event is not available via ANI the buy and cancel must be set to 0.

Edit program (See HP documentation - page 18)

Program Name = CableData Event #.

Orderable = F

Showing = True

Cancellable = F

Correctable = F

No blanking = F

4. Record ARU on Wed for Wed thru Tues events (see ARU procedures).

5. Run CableData authorization run (prior to 8:30am or after 5:00pm)

   DO NOT be run during business hours.

   Option <u>20</u> = Event File maintenance

   Sub Option <u>2</u>-set PPV autho code

   Key in autho code and run program

6. <u>HP</u> - <u>for ANI orderable events</u>

   35 minutes prior to the event go into the HP edit program and:

   Set orderable = <u>True</u>

   Cancellable = <u>True</u>

   Hit confirm screen

PACIFIC BELL
TECHNOLOGY ASSESSMENT

subject: IPPV Trial Vehicle:
Customer Interface User Manual

date: October 18, 1986

by: D. R. Lewis

CUSTOMER INTERFACE USER MANUAL

1. INTRODUCTION

This user manual describes the operation of the Impulse Pay Per View (IPPV) Trial Vehicle, Customer interface (C-interface), version 1.0.

The C-interface is provided so that the customer (cable franchise operator) may control the bulk order entry process which the trial IPPV service provides. The customer interface(s) of any IPPV service which might be offered in the future may differ from the interface described below.

2. C-INTERFACE INTRODUCTION AND FEATURES

The C-Interface provides the customer with control and monitoring capabilities as summarized here. Customer may ...

- view dialed phone number to event number translation map
- supply (character string) name for events
- view current order window status (opened=enabled or closed=disabled) either for a selected event, or for all events
- enable or disable order window of a selected event
- view current enable/disable status of automatic event scheduler
- enable or disable event scheduler
- view current scheduler program
- view current audio response unit status

---

3. WHEN TO USE THE C-INTERFACE

Use of the C-interface is recommended:

1. ... following any announcement audio message update session, to verify that all response units updated, accepted the recorded messages and returned to the on-line (available) state.

2. ... as required to control or retrieve the status of event ordering windows (opened or closed). (bypass scheduler)

3. ... as required to control or retrieve the status of the event scheduler (enabled or disabled).

4. ... as required to view current directory number to event number translations, event description strings or the schedule of the event scheduler.

4. BASIC OPERATIONS

Basic operations are described below. Directory (telephone) numbers, contact names, login names and passwords, and other information subject to change is included in attachment B. The user may be instructed to call the trouble reporting number given in this attachment. Calls to the trouble reporting number should be made during normal work hours if possible. If trouble is discovered which impairs system function or performance, the user should call the trouble reporting number immediately. If the trouble does not impair system function or performance (such as when only one of two dial-up lines fails), the call to trouble reporting should be differed until the next work day. In the following sections, to "report" (trouble) means calling the trouble reporting number given in attachment B, and reporting the problem to the party who answers.

Assistance with the following procedures may be obtained by calling the general trial technical support contact given in attachment B.

4.1 CONNECT AND LOG IN

In order to access the C-interface, a user must first use a terminal (or personal computer with terminal emulation software) and modem to establish a dial-up connection with the PBSN's controller. The user must then enter two login names and one password before the C-interface is reached. A dial-up connection may be established by

---

following the steps given below. If the reader is directed to report trouble to the IPPV trouble reporting number, inform the answering party that the trouble occurred while "establishing a dial-up connection".

1. Set up terminal/pc/modem to operate at 8 data bits, 1 stop bit and no parity.

2. Dial (or have modem dial) either of the dial-up directory numbers given in attachment B.

   If the number is busy, try the second number given in the attachment. If both numbers are busy wait a short time and try again. If this condition persists, call the IPPV trial trouble reporting number to report "both dial-up lines persistently busy".

   If there is no answer on the first number, make a note to report "no answer on first dial-up line", and try the second number. If the second number fails to be answered, report "no answer on second dial-up line."

3. After answer, elicit an "id:" prompt from the security port within PBSN. If no "id:" appears immediately:
   type <u><cr></u>   expect   "id:"

   If no "id:" appears type <u><cr></u> again. If no "id:" appears after several tries, check your set up and repeat. If no "id:" appears after repeating, try the second dial-up number and make a note to report "no id prompt on first dial-up line." If no "id:" appears using the second dial-up number, report "no id prompt on second dial-up line".

4. When "id:" appears, enter login name #1
   type <u><login name #1><cr></u>
   expect "valid access"

   If "valid access" doesn't appear, check your <login name #1> and repeat step 4. If "valid access" fails to appear after several attempts, make a note to report "no valid access on first dial-up line," and try the second dial-up number. If no "valid access" appears using the second dial-up line, call the trouble reporting number and report "no valid access on second dial-up line."

---

5. When "valid access" appears, elicit a "login:" prompt from the computer within the PBSN. If no "login:" appears immediately,

   type <cr>   expect   "login:"

   If no "login:" appears type <cr> again. If no "login:" appears after several attempts, make a note to report "no login prompt on first dial-up line," and try the second dial-up number. If no "login:" appears using the second line call the trouble reporting number to report "no login prompt on second dial-up line".

6. When "login:" appears, enter login name #2,

   type <login name #2><cr>
   expect "password:"

   If no "password:" appears, repeat step 6. If no "password:" appears after several tries, make a note to report "no password prompt on first line." If "password:" fails to appear using the second line, call the trouble reporting number to report "no password prompt on second line."

7. When "password:" appears, enter password,

   type <password><cr>
   expect "Enter command(<cmd list>,?)"

   If "login:" appears again, check your login name #2 and password and repeat steps 6, 7 and 8. If "login:" appears repeatedly, call the trouble reporting number and report "login not accepted."

   If anything other than "login:" or "Enter Command..." appears, call the trouble reporting number and report "client shell not working."

8. When the main prompt, "Enter Command(<cmds>,?)", appears, select a command by entering the single corresponding key and <cr>.

9. **Repeat selecting commands and viewing results until you wish to logout**

10. **To logout select the 'Q' option from the main menu.**

---

5. C-INTERFACE COMMANDS

The commands which the customer can access at the main menu are as follows:

S View scheduler enable/disable status and program
E Enable scheduler
D Disable scheduler
C Enter event control sub-menu
Q Quit (and logout)
? Display help

notes: a. no arguments are expected
b. use <cr> after entering the letter corresponding to command desired

The following sections describe the available commands. Help in using these commands may be obtained by contacting the general trial technical support contact listed in attachment B.

5.1 SCHEDULER STATUS COMMANDS - S, E and D

The **S command** can be used to determine whether automatic event window opening and closing is occurring (scheduler enabled) and to view the current scheduler program. The **E command** command will enable the event scheduler, while the **D command** will disable it. While the scheduler is enabled, order and cancel windows will be opened and closed according to a fixed schedule supplied by the customer. While disabled, the scheduler will neither open nor close event windows. Commands accessible from within the 'control sub-menu' (see C command), may be used to manually open or close event windows. When the scheduler is enabled, the status of the events will not be affected until the time of the next status change as dictated by the scheduler program. Particularly, if the scheduler is enabled at a time when one or more event windows should (already) be open, the user must manually enable (open) these events. Likewise, event windows will neither be opened nor closed when the scheduler is disabled. If the scheduler is disabled after it opens an event window, but before it closes that event window, the window will remain open until the customer closes that window manually. The customer may request that the scheduler program be changed by contacting the general trial technical support number in appendix B.

5.2 EVENT CONTROL COMMAND AND SUB-MENU

Selecting the event control command (**C command**) makes a new set of commands available. The commands belonging to this new set can be used to monitor and sense event window and announcement unit status.

The event control sub-menu contains the following commands:

R	Without id specified - retrieves status of all events and associated announcements
R <id>	With id specified - retrieves status of a single event and its associated announcement
E <id>	Enable receipt of orders for the specified event (open order window)
D <id>	Disable receipt of orders for the specified event (close order window)
P	Without id specified - retrieves the profile of all events
P <id>	With id specified - prompts for a new event description for the specified event
Q	Quit (and return to main prompt)
?	Display help menu

5.2.1 EVENT STATUS AND CONTROL COMMANDS - R, E, and D

The **R** command will recall current event window and announcement unit status to the screen. This status information includes, for each event selected:

- o the event identification (id) (an integer)
- o the directory numbers which, when called, will trigger an order of the event
- o the current event description string
- o the current announcement status

The event id is used with certain commands to indicate which event the command should operate on. The directory numbers referred to are the telephone numbers which cable subscribers will dial to order (or cancel) events. The event description string is provided so that the customer may associate a name with each event. The event description string may be changed using the 'P' command described below. The **E** command will enable the specified event's order window, while the **D** command will disable the specified window. The E and D commands on this menu should not be confused with the E and D commands on the main menu. The directory number to event id translation may be changed by contacting the general trial technical support number.

The possible event/announcement unit status states are as follows:

- enabled
  - event accepting calls (window open), announcement ready to play
- disabled
  - event not accepting calls (window closed), announcement ready to play
- off-line and enabled
  - event accepting calls (window open), announcement not ready to play (either recording in process or recording unacceptable - too long)
- off-line but not enabled
  - event not accepting calls (window closed), announcement not ready to play (same as above)

If an event is enabled (order window is open), calls to the directory numbers corresponding to it will be answered and terminated on the order acknowledgment announcement dedicated to the ordered event. A "call information delivery message" will be immediately forwarded to the customer. If the required (dedicated) announcement is unavailable (off-line), the order will still be accepted (call information sent to customer) and the caller will hear a low-high-high sequence of tones to indicate order acknowledgment.

If an event's status is disabled (order window is closed), calls to the directory numbers corresponding to it will be answered and terminated on a common 'differ order' announcement and an "order information delivery message" is NOT forwarded to the customer. If the differ order announcement is unavailable (off-line), callers will be routed to a 'call can not be processed as dialed' message.

The common differ order announcement has been assigned to an unused event id. This allows its current status to be found in the output of an 'R' command. Particularly, this status may be found on the 'R' command output line which is identified by a description string of "COMMON ORDER DEFERRAL." The window status of the common differ order announcement may not be disabled (or Enabled). Using an unused event id also allows the "announcement update telephone number" corresponding to it to be found, as described later. This event id may be identified by invoking an 'R' command, finding the line containing the string "COMMON ORDER DEFERRAL," and reading the corresponding event id.

5.2.2 EVENT PROFILE COMMAND

The event profile command (P command) may be used to view or change the event description strings. Selecting 'P' without supplying an event id will cause all current profile data to be dumped. The event id, event directory numbers, and event description string are included for each event selected. Selecting 'P' followed by an event id will cause the system to prompt the user for a new event description string for the specified event. The user may either enter a new string (to the maximum number of characters indicated) or enter <cr> to leave the string unchanged. The description string "COMMON ORDER DEFERRAL," may not be changed.

5.2.3 QUIT COMMAND (event control sub-menu)

The user should use the event control sub-menu's quit (Q command) to return to the main menu.

5.2.4 HELP COMMAND (event control sub-menu)

The '?' command within the event control menu will display a list of the event control sub-menu commands.

5.3 QUIT COMMAND (main menu)

The quit command on the main menu should be used when the customer is finished using the C-interface. The Q command will terminate the dial-up session and hang up the modem.

5.4 HELP COMMAND (main menu)

The '?' command on the main menu will display a list of the main menu commands.

6. <u>AUDIO ANNOUNCEMENT UPDATE (RECORD)</u>

6.1 GENERAL INFORMATION

The audio announcements which callers to the IPPV telephone numbers will hear may be recorded by the customer. As stated previously, each event has a corresponding (dedicated) announcement associated with it. There is also a common differ order announcement which is played to callers ordering disabled (closed order window) events.

To record a new announcement, the user first uses the corresponding event id to determine the associated announcement update telephone number. The user then calls this telephone number with an ordinary telephone and interacts with an audio response unit (ARU) to accomplish the update.

Appendix A includes an "event id" to "announcement update telephone number" look-up table. This table should be used to determine the telephone number to be dialed in order to update a particular event's announcement.

The common differ order announcement is updated in a similar manner. It has been assigned to an unused event id so that the 'R' command within the event control sub-menu may be used to determine its event id and current status. To find the common differ order announcement's update telephone number, the user should invoke the 'R' command, find the event (line) with a description of "COMMON ORDER DEFERRAL," and read the corresponding event id. With this event id, the user should use the table in attachment A to find the associated announcement update telephone number.

6.2 PROCEDURES

In order to update an announcement the steps listed here should be followed.

1. Determine the announcement update telephone number.

   If the announcement to be updated is an order acknowledgment announcement, (as opposed to the common differ order announcement), use the event's id to look up the update telephone number directly in the table in attachment A.

   If the announcement to be updated is the common 'differ order' announcement, find the event id corresponding to it by using the 'R' command, as described above, and look up the update telephone number in attachment A.

2. Using an ordinary tone dial (Touch Tone) telephone set, dial the number found during step 1. Expect to hear ringing, have the ringing answered and to hear a single high pitched beep.

If the ringing is not answered, call the trouble reporting number given in attachment B to report "no answer on ARU update for event xx," where xx is replaced by the involved event number.

If the phone is busy, wait a short time and try again. If the phone remains busy, call the trouble reporting number and report "persistent busy on ARU update for event xx," where xx is replaced by the involved event number.

3. Follow the instructions provided in attachment C to update the announcement. Be certain to fully depress tone buttons of the telephone in order to insure that the ARU doesn't miss keystrokes. The following steps highlight the announcement update process.

   a. On hearing the single high pitch beep described in step 2, enter the three digit password (see attachment B). Expect to hear two high beeps as the unit's positive acknowledgment of password receipt.

      If unit hangs up after the password is entered, repeat steps 1 through 3a. If unit hangs up repeatedly, call the trouble reporting number and report "ARU password rejected for event xx," where xx is replaced by the id of the involved event.

   b. After two beeps, play the existing message:
      press <u>89</u>
      expect to hear message followed by two beeps.

   c. Prepare to record new message by practicing the new announcement. The messages may be no longer than ten seconds.

   d. (After two beeps) begin recording:
      press <u>79</u> ... speak announcement
      end by pressing <u>9</u>.

   e. (After two beeps) play new message:
      repeat step b.

   f. Repeat steps c., d. and e., until new message is as desired:

---

g. Hang up phone to terminate announcement update.

4. Repeat steps 1. through 3. for each announcement to be updated.

5. Wait at least two minutes after hanging-up following the last announcement unit update and then use the 'R' command to view the current status of the updated announcements. Expect to see "enabled" or "disabled."

   If the status of an updated announcement remains "off-line" following an update, check that the length of message doesn't exceed ten seconds, repeat the update of the troubled announcement, and repeat step 5. If the announcement still remains "off-line," call the trouble reporting number given in attachment B, and report "announcement remains off-line following update."

---

7. RECOMMENDATIONS, GUIDELINES, SUGGESTIONS

The customer is provided the following comments concerning use of the 'C interface:'

- o Reserve two unique event ids (and corresponding directory numbers) for each viewable event.
- o Assign one of these event ids to be the 'order' event, and record an event specific 'order' request acknowledgment message in the announcement unit dedicated to it.
- o Assign the second event ids to be the 'cancel' event, and record an event specific 'cancel' request acknowledgment message in the announcement unit dedicated to it.
- o Compose an event description string for each event id, (ie. "Viewer's Choice order") and enter these stings into the system using the 'P' command.
- o Compose a scheduler program (window open and close times) for each event. Have Pacific Bell's trial support personnel install this program.
- o Use the Enable Scheduler command ('E' on main menu), to enable the scheduler when ready.
- o If event order or cancel requests can not be processed by the customer, the announcement(s) corresponding to the unavailable event should be changed so that subscribers are informed of the problem. The event window should be (left) enabled so that callers will hear the revised message.

EVENT ORDER DIRECTORY NUMBER SET

270-1110 through 270-1179

EVENT ORDER DIRECTORY NUMBER TO EVENT ID TABLE

DIRECTORY NUMBER	EVENT ID	ASSIGNMENT
270-110X	1	confirm/differ message
270-111X	2	confirm/differ message
270-112X	3	confirm/differ message
270-113X	4	confirm/differ message
270-114X	5	confirm/differ message
270-115X	6	confirm/differ message
270-116X	7	confirm/differ message

(X means doesn't matter)

EVENT ID TO ANNOUNCEMENT UPDATE TELEPHONE NUMBER TABLE

EVENT ID	UPDATE TELEPHONE NUMBER
1	829-6724
2	829-6725
3	829-6726
4	829-6727
5	829-6728
6	829-6729
7	829-6741

dial-up data port directory number: first 829-6882
second 829-6883

trouble reporting contact
M-F 8:00am - 5:00pm name:
phone: TO BE PROVIDED (Use Below #s)
other name:
phone:

general trial technical support
M-F 8:00am - 5:00pm name: DAVE LEWIS / MikeVARGO
phone: 823-3047 / 823-3048
other name: DAVE LEWIS
phone: 415-947-8789
(Enter Your Return Phone Number)

login names and passwords:
login name #1: (Viacom Entry)
login name #2: viacom
password #2: zelmo1

announcement update telephone access password:
announcement unit
password is now 4 6 3

current common order deferral message
common deferral message
is assigned to event id 7

DBE2071.0625472D

Table 2. Remote Record Telephone Key Identification

KEY	FUNCTION	SINGLE CHANNEL ANNOUNCER	MULTI-CHANNEL ANNOUNCER
1	Channel One Message	Not used	Accesses first recorded message
ABC 2	Channel Two Message	Not used	Accesses second recorded message
DEF 3	Channel Three Message	Not used	Accesses third recorded message
GHI 4	Channel Four Message	Not used	Accesses fourth recorded message
JKL 5	None	Not used	Not used
MNO 6	Erase Entire Message	Used to blank out an entire message all at one time without regard for length or content (ERASE cannot be used to edit a recorded message).	
PRS 7	Record New Message	Used to record a new message from a remote telephone (message length cannot exceed the maximum capacity of the digital announcer).	
TUV 8	Playback Present Messages	Used to listen to present message (may be used as many times as necessary, since the message length or content are not changed by a playback).	
WXY 9	Start or Stop	Used with erase, record, or playback functions above; press button once to initiate any selection; press button again to terminate this selection.	
~~*~~	~~Extra C/MC Pulses~~	~~Used during recording to add up to twenty extra C/MC relay operations between beginning-of-message and end-of message pulses. Each button press stores one 250 millisecond pulse.~~	
0	Reset Announcer Mode	Used to immediately terminate any function and clear the Announcer for disconnect in 20 seconds if no new function is selected (message content is not altered by the reset).	
#	None	Not used	Not used

VIACOM MEMO

TO: DISTRIBUTION

FROM: Dave Archer

DATE: November 26, 1986

SUBJECT: SCIENCE DYNAMIC'S ANI EQUIPMENT

Enclosed your your reading enjoyment is information on Science Dynamic's ANI equipment used in Centel's Traverse City, Michigan ANI trial.

Coincidentally, PacTel recently contacted Science Dynamics to determine if:

1. This equipment could be used when PacTel rolls-out its California ANI service, or

2. Science Dynamics would be interested in building a proprietary device for PacTel based on the equipment already in use in PacTel's East Bay trial.

As always, I'll keep you informed of any new development...

DISTRIBUTION:

Mike Johnson
Matt Miller
Tom Neville
Doug Semon
Joe Van Loan

Science Dynamics
CORPORATION

1919 Springdale Road • Cherry Hill, New Jersey 08003 • 609-424-0068

October 14, 1986

Mr. Richard Erwin
Manager
Cable TV Puget Sound
2316 South State St.
Tacoma, WA 98405

Dear Mr. Erwin:

Science Dynamics' Multi Access Cable Billing System (MACBS) provides the most practical method of ordering Pay-Per-View programming on impulse. The ultra secure medium of Automatic Number Identification (ANI) is ideally suited for impulse ordering - it's quick (8 seconds/transaction), secure (hacker proof) and efficient (zero capital expenditure by the cable operator).

Let us examine alternatives for Impulse Pay-Per-View (IPPV) Ordering:

- CSR Entry - Manual order taking by an available customer service representative. The average transaction time is about four (4) minutes. Each CSR can take about fifteen an hour which, with phone lines and overhead, cost about $1.50/transaction.

- Audio Response - There are several ARU's being marketed to automate the CSR activity. They are capital intensive ($60,000 - $250,000 plus maintenance) and cannot accommodate dial pulse subscribers - over fifty (50%) percent of the existing telephone offices cannot forward Touch Tone signals. This results in a lot of resources being expended to service less then fifty (50%) percent of the subscribers. This approach does nothing to reduce "network" congestion - the biggest deterrent to Impulse Ordering.

Mr. Richard Erwin
Page 2
October 14, 1986

- Two Way System - very capital intensive initially, and also for the continuing maintenance aspects. It is not dependent on the telephone so it does avoid the network congestion problems of the CSR and ARU approaches. This arrangement has it's advantages but as the system ages, the maintenance cost escalate dramatically. Already, some progressive operators have been able to cost justify the conversion back to one-way and shut down the two way based on the high maintenance cost. There are also problems regarding customer acceptance - mostly the lack of an acceptable, positive order acknowledgement.

- Store and Forward - A very insecure method, highly susceptible to fraud and nonbillable orders. Requires very expensive headend equipment and convertors, or the addition of "Side Car" devices. Modular phone jacks must also be installed by the phone company (at a cost to the customer of about $150.00) or alternately by the cable operator's service personnel resulting in substantial cost to the operator. Video clubs are being promoted - where the customer pays three to five dollars a month (regardless of whether they order a PPV Event) to offset the abnormally high cost of implementation). This mode is considered exhorbitant and is hindering the growth of the Pay-Per-View industry. Even with the Video Club revenues the ROI of initial cost could take a decade.

- ANI Ordering - The cable operator reimburses the telephone company on a transaction basis (approximately twenty-five [0.25] cents) for providing a secure medium, that eliminates the possibility of network congestion (and the resultant lost sales), requires no capital expense and will effect IPPV capability to both Touch Tone and Dial Pulse subscribers. When MACBS is deployed as the ANI ordering vehicle the added guarantee of compatibility with existing billing/convertor controller equipment is included. This approach makes cents-lots of them!

Mr. Richard Erwin
Page 3
October 14, 1986

Obviously, we have a parochial interest in promoting ANI ordering, but we consider this an objective disertation. The CATV industry is being challenged by the proliferation of video stores, personal satellite dishes, and alternative programming. IPPV appears to be the answer to the industry's dilemma. Until ANI ordering was available- basic service provided the best ROI. Multi-Pay has a low ROI considering addressable convertor cost and program revenue sharing. Two-way and other PPV ordering techniques are capital intensive with no guarantee that a suitable ROI will ever be realized.

ANI ordering not only effects a better ROI than basic service - it's safe! If PPV programming does not improve, and subscriptions do not meet anticipated projections, capital will not have been expended needlessly. If PPV takes off as we expect, everybody wins! Call your local operating telephone company and demand ANI ordering services. If you need assistance or telephone company contacts, call us at your earliest convenience.

Sincerely,

J. T. Shelley

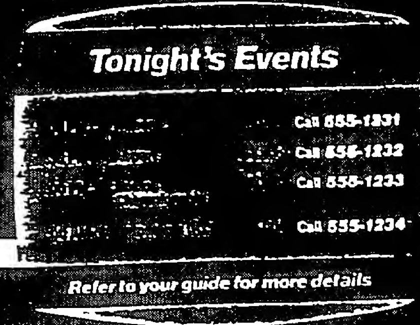
J. T. Shelley
Director, Marketing

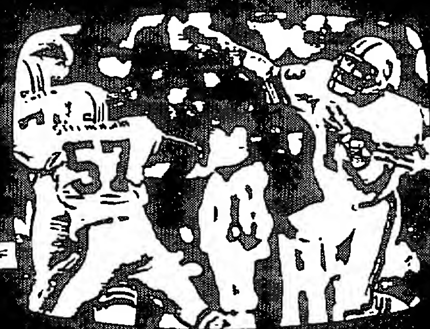
JTS/tf

Enclosures

MACBS

Multi-Access Cable Billing System



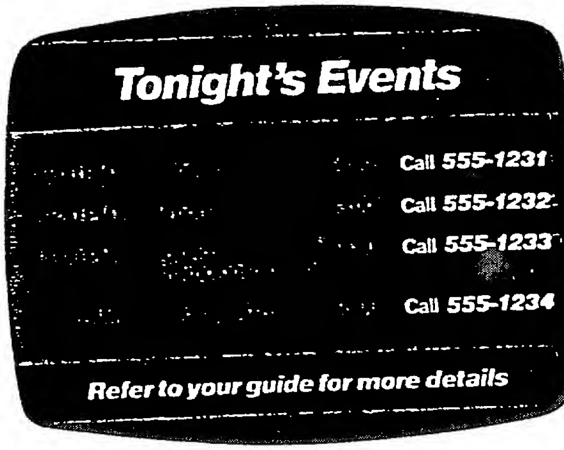


Impulse Pay-Per-View

Science Dynamics CORPORATION

Impulse Pay-Per-View

Impulse Pay-Per-View is already generating enormous revenues. Science Dynamics' Multi-Access Cable Billing System (MACBS) enables telephone operating companies and CATV program providers the opportunity to work together to dramatically increase market penetration, improve customer service and participate in a new revenue source.



CATV companies can offer Impulse Pay-Per-View without requiring the installation of costly two-way converters. In fact, no capital expenditures are required by cable operators that have one-way addressable converters installed because MACBS uses equipment that every customer already has, namely, a telephone.

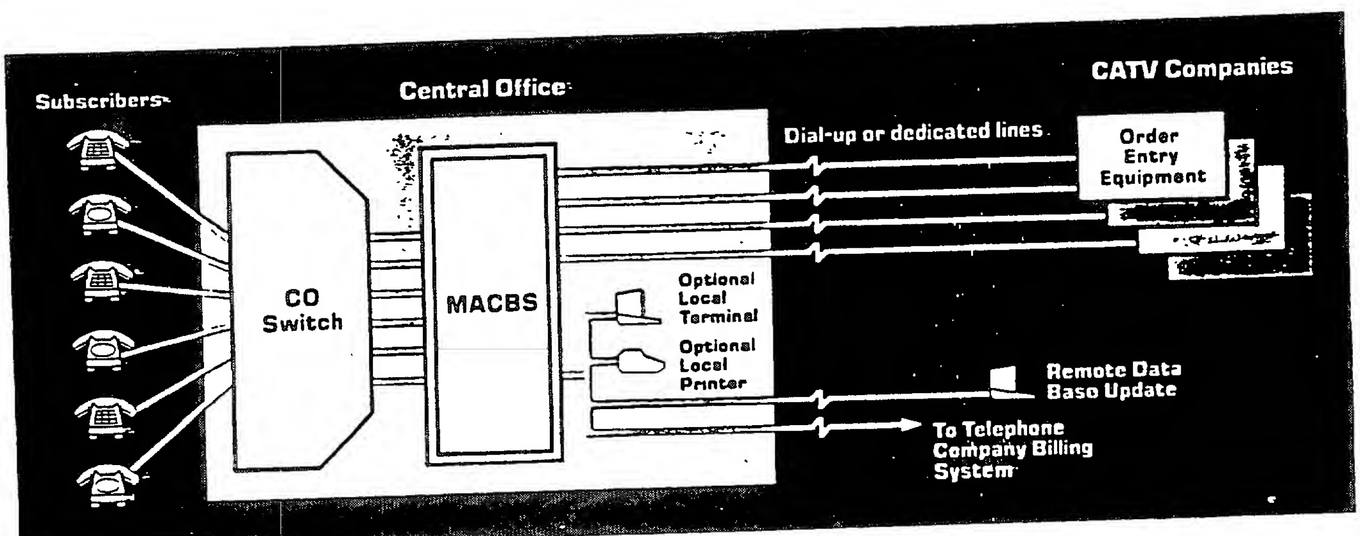
MACBS provides better service for the customer because it eliminates the delays inherent in other types of ordering systems. It also eliminates telephone network congestion in the period preceding a premium offering. Telephone companies increase revenues using existing plant since most Pay-Per-View calls usually occur during off-peak hours.

How It Works

The MACBS equipment is located in a telephone company central office The CATV company presents a "Menu" channel listing premium offerings, each with an associated telephone number The same information may also be listed in the program guide. The customer makes a selection by calling one of the listed numbers using a push button or rotary dial telephone.

The call is routed to MACBS through the telephone facilities via ANI sending type trunks. MACBS stores the called and calling numbers in buffers while it accesses its data base to identify the CATV company. It then transmits the selection and customer identification to the specified order entry activity, acknowledges the order with a brief voice announcement to the customer and records the transaction for bulk billing by the telephone company. Typically, a special assembly tariff affords compensation based on a negotiated fee per transaction

In the event of an incomplete transaction resulting from an invalid number, ANI failure, faulty transmission, etc., MACBS will inform and/or instruct the customer with an appropriate voice announcement. Called numbers not found in the MACBS data base are stored in default buffers for investigation



(609) 234-4558 RES

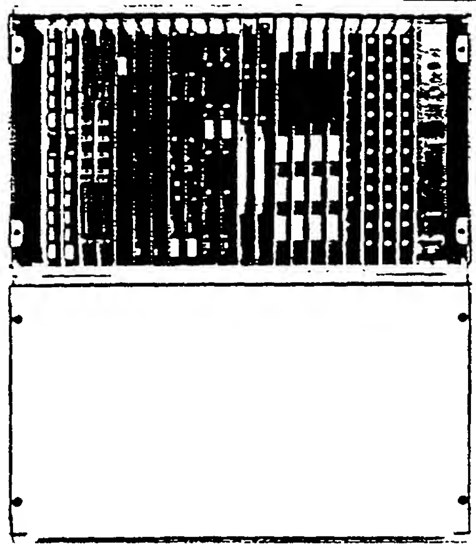
J. T. SHELLEY
Director - Marketing

SCIENCE DYNAMICS CORPORATION
1919 SPRINGDALE ROA
CHERRY HILL, NJ 0800

MACBS Multi-Access (

Eight Seconds Per Transaction

Customer calls are handled by MACBS at the telephone company central office, eliminating the need for customer service representatives and telephone trunks at the CATV company. The call holding time is typically eight seconds for a complete transaction as compared to about a minute and a half with CATV companies that use customer service representatives or interactive voice-prompting systems. A MACBS system with only twenty-four trunks can process about 9000 Pay-Per-View orders every hour. A system with one hundred and twenty-eight trunks can process over 45,000 orders per hour.



Low-Cost Field Expansion

The microprocessor-controlled MACBS system employs a distributed architecture for maximum speed, efficiency and reliability. It is modular in design, providing low-cost field expansion using plug-in modules.

A standard MACBS system can be configured to support up to one hundred and twenty-eight telephone company trunks. Special configurations are available for larger installations. Dual port modules are provided for each CATV company, one on-line and one back-up. These plug-in modules are easily added in the field as the system expands. There is also a dial-up port for data base updates and retrieval of billing data and traffic statistics. Contact closures are provided to interface with existing central office alarm systems.

MACBS is powered by standard central office battery (−48 VDC). The operational software is

protected RAM. The MACBS data base can be accessed independently, even during peak transaction processing periods, from a local terminal or a remote location via the dial-up port. Access is protected with a security code.

Telephone Company Trunk Interface

Science Dynamics' MACBS operates with all standard ANI formats. MACBS operates with CAMA and/or TSPS type trunks and/or signal circuits. Various trunk supervisory protocols are supported. System expansion is accomplished with plug-in modules, each containing four trunk interfaces. Program-selectable parameters identify the type of circuit connected to each input.

CATV Company Interface

The links to the CATV companies may be dial-up or dedicated. If a dial-up connection is used, MACBS will constantly monitor transmission and maintain the connection as long as there is activity. Data is transmitted at 1200 bps over dial-up facilities. MACBS can also transmit data at higher speeds over dedicated lines to accommodate larger volumes. MACBS can respond to requests for retransmission from cable company systems.

MACBS Announcements

MACBS announcements are factory recorded from customer-supplied text. A professional voice is digitally encoded and stored in non-volatile EPROM using technology proven in Science Dynamics' Intercept systems. New announcements are easily added with replacement EPROMs.

Science Dynamics
CORPORATION

Specifications

Capacity	128 trunks
Interface type (CAMA/TSPS)	E & M and loop trunks
Interface connector	Standard Telco 50 pin
Output port	RS232C
Transmission speed	1200 to 4800 bps
Input voltage	−48 VDC
Dimensions, subrack	12"H x 23"W x 12"D
Mounting	23" relay rack
Weight per subrack	30 pounds
Environmental	5°C to 50°C 10% to 90% humidity, non-condensing
Configurations	Two subracks for 4 to 16 trunks. One additional subrack for each additional 16 trunks.

Printed in U.S.A.
Specifications subject to change without notice.

Science Dynamics Corporation
1919 Springdale Road • Cherry Hill, NJ 08003 • 609-424-0068

PACIFIC/CATV HYBRID
PAY-PER-VIEW FEATURE

Pacific Bell proposes a cooperative arrangement with CATV Companies to provide cable television subscribers with a convenient, efficient system for ordering pay-per-view programming (PPV) over standard telephone lines.

The proposed hybrid will allow the CATV Company to expand into the rapidly developing, profitable PPV market minimizing upfront capital expenditures and reducing operating costs.

PPV can help boost CATV subscriber penetration leading to increased profits, as well as help meet municipal franchise commitments to provide interactive capabilities on its cable system.

SYSTEM DESCRIPTION

CATV will provide the downstream link from the system headend to subscriber locations while Pacific Bell's network will be used for the upstream link from subscriber locations to the cable system headend.

CATV subscribers will order PPV programming by dialing a local telephone number corresponding to a particular PPV event. The phone call must originate from the location the subscriber wants the PPV service delivered. The call will be routed over standard telephone lines to a Pacific Bell Central Office where an answering machine would receive the call, identify the program ordered and note the subscribers telephone number. Information will then be routed to the CATV facility where the order and billing information will be confirmed. Finally the PPV event can be delivered to the subscriber's home through an addressable convertor connected to the television set.

The PPV feature of the hybrid has been designed to handle the high volume of peak period impulse orders.

CATV Companies will have to develop software to convert subscriber telephone numbers and PPV event telephone numbers dialed into service order, program delivery and billing information.

Pacific Bell has the technology and equipment needed to activate the PPV hybrid now.

Pacific Bell is pleased to enter the interactive information age with CATV as a partner.

Donna Brickell, Project Manager Kare Anderson, Director
Pacific Bell • 444 Market Street, Room 1210 • San Francisco, CA 94111
(415) 774-8341

(DB3,9)

U.S. WEST
A N I ORDER ENTRY

Service Description

Provides order entry capabilities for massive impulse ordering requirements via a touch tone or rotary telephone. The service will capture the called and calling numbers and forward them to the cable operator by virtue of a dedicated data link in real time.

This service will satisfy four key market needs:

High Impulse Capacity

Experience has proven that consumers wish to delay ordering until the last moment. For marketing reasons, this behavior is to be encouraged in order to benefit from impulsive consumer buying decisions. However, impulse buying makes extraordinary demands on the order entry system. A good system must have sufficient capacity to handle the bursty order levels in the final minutes prior to event time.

Simple and Easy to Use

The consumer interface will be extremely simple, easy to understand, and natural to use. This, again, will allow consumers the ability of last minute buying decisions. Subscribers must have the ability to place orders without being inhibited, intimidated, or foiled by the ordering system.

Economical with Low Initial Costs

The system will be economical in a a relatively low margin business such as pay-per-view. Moreover, a system with low initial cost will allow operators to experiment with pay-per-view with minimal risk.

Direct Interface with the Cable Company's Billing Computer

This is a requirement of an overall pay-per-view transaction processing system that is all too often ignored. It will enable fully automated handling of pay-per-view transactions from beginning to end.

Order Entry

A description of the order entry process is as follows:

1. Each pay-per-view channel available will have a toll-free telephone number associated with it. To order a pay-per-view movie or event, the cable subscriber simply dials the associated telephone number for that event. The caller may utilize a telephone with either touch tone or dial pulse signaling. However, the consumer must dial from his or her own home.

2. The call is routed through the local network. The network will identify the caller's telephone number automatically by Automatic Number Identification via the central office serving the Subscriber.

3. The call is routed to a switching office where, by an arrangement of trunks within the network, it terminates at a processor unit. A "thank you" announcement is given to the caller acknowledging that the order has been placed. When the caller hears the announcement, he or she either hangs up or the announcement facility disconnects the call when the announcement is completed.

4. The telephone company will pass the calling (ANI) and called number (indicating the event) to the CATV billing computer over a dedicated private data line in a standard data protocol.

5. The billing computer contains an on-line database of the cable company's subscribers' telephone numbers. The processor may perform a number of validity checks or "edits" including:

   - The customer's telephone number exists in the database;

   - The customer's home is equipped with addressable outlets capable of handling pay-per-view;

   - The customer's account is active;

   - The customer is not in collection;

   - Whether ordering the event will not put the customer beyond their credit limit;

   - Which outlet in the home is authorized.

6. Those orders not qualifying for pay-per-view service will be noted automatically by computer software. A phone call to that customer, informing them that their order cannot be accepted, can be placed manually by customer service representatives. The cable company may choose to pursue these as future customers, candidates for addressable converter installation, or to motivate payment of an overdue bill.

7. The billing computer than passes the customer's identity to the addressable headend controller. At or before the start of the program, descrambling is activated in the subscriber's addressable converter.

8. Statistics of orders for each program will be available within minutes.

Dialing Plan Scenario

- Subscriber view Program Guide or barker channel and determines program choice.

- Subscriber dial seven digit number associated with Program Guide (e.g., XXX-0001)

- Audible ringback is heard by subscriber through ANI transmission/decode cycle.

- Subscriber hangs up.

- The following information will be forwarded to the CATV company via 1200 baud data line in real time.

    1. Calling number (ANI)
    2. Called number (event)

- CATV company's premise computer interfaces headend to activate subscriber's converter.

PAY-PER-VIEW MESSAGE FORMAT

1. This is the format used with the first US West System.

The message format is sent over the cable TV vendor modem link to the cable TV vendor facility for each call is as follows:

1234567890 [SPC] 1234 [LF] [CR]

170 bits
assume 200

SPC = ASCII 20H
LF = ASCII 0AH
CR = ASCII 0DH

The 10-digit sequence is the calling subscriber's phone number (ANI).

The 4-digit field is the program number.

The above message is transmitted at 1200 baud; serial word format is 8 data bits, no parity, 1 stop bit.

2. This format first used with Zenith system.

The message format sent over the cable TV vendor modem link to the cable TV vendor facility for each call is as follows:

[STX] [CR] [LF] 1234567890 [SPC] 1234 [ETX]

STX = ASCII 02H
ETX = ASCII 03H
CR = ASCII 0DH
LF = ASCII 0AH
SPC = ASCII 20H

The 10-digit sequence is the calling subscriber's phone number (ANI).

The 4-digit field is the program number.

The above message is transmitted at 1200 baud; serial word format is 8 data bits, no parity, 1 stop bit.

H

United States District Court,
E.D. Pennsylvania.

Ronald A. KATZ, Technology Licensing, L.P., and MCI Telecommunications Corporation, Plaintiffs,
v.
AT & T CORPORATION, et al., Defendants.

No. CIV. A. 97-4453.

Aug. 26, 1999.

Owner of patents for interactive voice response system sued telephone company for infringement. The District Court, Lowell A. Reed, Jr., Senior District Judge, construed claim language.

Claims construed.

West Headnotes

[1] Patents 314(5)
291k314(5) Most Cited Cases

Construction of patent claims is exclusively within province of court to determine as matter of law.

[2] Patents 159
291k159 Most Cited Cases

[2] Patents 165(1)
291k165(1) Most Cited Cases

[2] Patents 167(1)
291k167(1) Most Cited Cases

[2] Patents 168(2.1)
291k168(2.1) Most Cited Cases

In construing patent claim, court should consider claim language, specification, and, if offered, prosecution history, which are collectively considered intrinsic evidence of meaning of claim terms; under some circumstances, court may also consult evidence extrinsic to patent, such as technical dictionaries or expert testimony as to how those skilled in relevant art under consideration would interpret claims.

[3] Patents 161
291k161 Most Cited Cases

Absent special and particular definition created by patent applicant, term in patent claim is construed to mean what person of ordinary skill in art at time of invention would have understood term to mean.

[4] Patents 157(1)
291k157(1) Most Cited Cases

Unless otherwise compelled, court should give full effect to ordinary meaning of patent claim terms, even if terms are broad.

[5] Patents 162
291k162 Most Cited Cases

[5] Patents 167(1)
291k167(1) Most Cited Cases

[5] Patents 168(2.1)
291k168(2.1) Most Cited Cases

Once court construing patent terms has determined ordinary meaning of the claim term, it must also consider specification and prosecution history to determine if patentee used term in manner inconsistent with its ordinary meaning.

[6] Patents 167(1.1)
291k167(1.1) Most Cited Cases

One may not read limitation into patent claim from written description, but one may look to written description to define term already in claim limitation, for claim must be read in view of specification of which it is part.

[7] Patents 167(1)
291k167(1) Most Cited Cases

While additional limitations may not be imported into patent claim from specification, court may construe limitation specifically recited in claim in light of specification.

[8] Patents 167(1.1)
291k167(1.1) Most Cited Cases

In order to inject definition into patent claim from written description, claim must explicitly contain term in need of definition.

[9] Patents 167(1.1)
291k167(1.1) Most Cited Cases

Patent claim term should not be narrowed by content of specification unless language of claim invites reference to those sources.

[10] **Patents** 162
291k162 Most Cited Cases

Patent claim term may be given definition other than its ordinary meaning if patentee chooses to be his or her own lexicographer by explicitly setting forth definition in specification, or if terms chosen by patentee so deprive claim of clarity that there is no means by which scope of claim may be ascertained from language used.

[11] **Patents** 168(2.1)
291k168(2.1) Most Cited Cases

Prosecution history cannot enlarge, diminish, or vary limitations in patent claims.

[12] **Patents** 168(2.1)
291k168(2.1) Most Cited Cases

Court construing patent claim may consider prior art cited in prosecution history, which may contain clues as to what claim does not cover.

[13] **Patents** 168(2.1)
291k168(2.1) Most Cited Cases

If patent applicant takes position before Patent and Trademark Office, such that competitor would reasonably believe that applicant had surrendered relevant subject matter, applicant may be barred from asserting inconsistent position when issued patent is subsequently construed.

[14] **Patents** 168(2.1)
291k168(2.1) Most Cited Cases

Unless altering claim language to escape examiner rejection, patent applicant only limits claims during prosecution by clearly disavowing claim coverage, that is, by making statement that concedes or disclaims coverage of claims at issue based on piece of prior art.

[15] **Patents** 159
291k159 Most Cited Cases

Extrinsic evidence is to be used for court's understanding of patent, not for purpose of varying or contradicting claim terms.

[16] **Patents** 159
291k159 Most Cited Cases

Extrinsic evidence may be consulted if court is not familiar with terminology of art in which patent is written, but it should not be consulted to clarify ambiguity in claim terms.

[17] **Patents** 159
291k159 Most Cited Cases

Where patent documents are unambiguous, expert testimony regarding meaning of claim is entitled to no weight.

[18] **Patents** 101(8)
291k101(8) Most Cited Cases

Presumption that use of term "means" in patent claim invokes means plus function limitations may be rebutted if claim recites no function which corresponds, or if claim recites function but also recites sufficient structure or material for performing claimed function. 35 U.S.C.A. § 112.

[19] **Patents** 101(8)
291k101(8) Most Cited Cases

Structural term in patent claim need not connote precise physical structure to those of ordinary skill in art in order to avoid means-plus-function analysis, so long as it conveys variety of structures that are referred to by that term. 35 U.S.C.A. § 112.

[20] **Patents** 226.7
291k226.7 Most Cited Cases

If structure is defined in patent specification in way unrelated to recited function in means-plus-function clause in claim, those additional aspects of structure should not be read as limiting scope of means clause. 35 U.S.C.A. § 112.

[21] **Patents** 101(8)
291k101(8) Most Cited Cases

In construing means plus function claims, generally a court should not import function of working device or preferred embodiment into claims as part of "means" if such function is not part of function recited in claims. 35 U.S.C.A. § 112.

[22] **Patents** 101(2)
291k101(2) Most Cited Cases

"Communication facility," called for in patent claims for interactive voice response system, was that part of telephone network that enabled caller to connect to patented system; term did not encompass elements or processes of entire public switched telephone network, or require that system be operated only outside network.

[23] Patents ⚷101(2)
291k101(2) Most Cited Cases

"Interface structure" for analysis control system, called for in patent claims for interactive voice response system, referred to hardware and software required to connect processors upon which system was running to communication facility such that information from facility and remote terminals could be provided to and received by system; in context, phrase also included means to perform specific function of providing caller data signals representative of data developed at remote terminals, and means to perform specific function of receiving calling number identification data.

[24] Patents ⚷101(8)
291k101(8) Most Cited Cases

Critical factor in determining whether term in patent claim limitation which does not invoke "means for" language is subject to means-plus-function analysis despite contrary presumption is whether term brings to mind set of structures to those of ordinary skill in art, and not whether term is written in functional language. 35 U.S.C.A. § 112.

[25] Patents ⚷101(2)
291k101(2) Most Cited Cases

"Means to provide caller data signals" and "means to receive calling number identification data," called for in patent claims for interactive voice response system, were limited to disclosed structures which specifically performed those functions. 35 U.S.C.A. § 112.

[26] Patents ⚷101(2)
291k101(2) Most Cited Cases

"Voice generator" for analysis control system, called for in patent claims for interactive voice response system, meant device for generating vocal instructions or prompts to individual callers at remote terminals.

[27] Patents ⚷101(2)
291k101(2) Most Cited Cases

"Record structure" for analysis control system, called for in patent claims for interactive voice response system, referred to means for entering or making use of files, but did not delineate or restrict types of functions that could be performed on files once they were accessed.

[28] Patents ⚷101(2)
291k101(2) Most Cited Cases

"Qualification structure" for analysis control system, called for in patent claims for interactive voice response system, was limited to disclosed structures which performed function of controlling access to system by individual callers. 35 U.S.C.A. § 112.

[29] Patents ⚷101(2)
291k101(2) Most Cited Cases

"Means for selecting," called for in patent claims for interactive voice response system, was limited to disclosed structures which specifically performed function of selecting format based on called number. 35 U.S.C.A. § 112.

[30] Patents ⚷101(2)
291k101(2) Most Cited Cases

"Switching structure" for analysis control system, called for in patent claims for interactive voice response system, meant device, including hardware and associated software, that could switch or route telephone calls or signals from one location or connection to another.

[31] Patents ⚷101(2)
291k101(2) Most Cited Cases

"Record testing structure" for analysis control system, called for in patent claims for interactive voice response system, was limited to disclosed structures which specifically performed function of receiving and testing signals against stored data. 35 U.S.C.A. § 112.

[32] Patents ⚷101(2)
291k101(2) Most Cited Cases

Term "processing," called for in patent claims for interactive voice response system, meant manipulation of data which performed some operation or sequence of operations on data.

[33] **Patents 101(2)**
291k101(2) Most Cited Cases

Term "format," called for in patent claims for interactive voice response system, meant computer program that set forth content and sequence of steps to gather information from and convey information to callers through pre-recorded voice prompts and messages.

[34] **Patents 101(2)**
291k101(2) Most Cited Cases

"Multiple formats" or "plurality of formats," called for in patent claims for interactive voice response system, meant more than one format; terms did not include subroutines or branching within single format.

[35] **Patents 101(2)**
291k101(2) Most Cited Cases

"Remote terminals," called for in patent claims for interactive voice response system, meant devices or instruments for connecting callers to telephone network for voice and digital communication, including, but not limited to, conventional telephones.

[36] **Patents 101(2)**
291k101(2) Most Cited Cases

"DNIS" and "called number identification data," called for in patent claims for interactive voice response system, were synonymous, and meant signal or data that identified number called.

[37] **Patents 101(2)**
291k101(2) Most Cited Cases

"ANI" and "calling number identification data," called for in patent claims for interactive voice response system, were synonymous, and meant signal that identified calling number, i.e., number from which call originated.

[38] **Patents 101(2)**
291k101(2) Most Cited Cases

"In-band" or "out-of-band" signaling, called for in patent claims for interactive voice response system, did not require or exclude any particular manner of transmission or type of signaling.

[39] **Patents 101(2)**
291k101(2) Most Cited Cases

"Consumable participation key," called for in patent claims for interactive voice response system, meant number or word that allowed caller access to service or part of service predefined limited number of times and which could not be refreshed or recharged.

[40] **Patents 101(2)**
291k101(2) Most Cited Cases

"Limit on use," called for in patent claims for interactive voice response system, meant control that limited caller's access to service based on some predetermined method of measuring level of use; term was not restricted to specific method of measuring use, such as limited number of accesses into system.

[41] **Patents 101(2)**
291k101(2) Most Cited Cases

"Products carrying participation numbers," called for in patent claims for interactive voice response system, meant physical items sold or exchanged in commercial setting which carried number allowing participation in system.

[42] **Patents 101(2)**
291k101(2) Most Cited Cases

"Accounting data," called for in patent claims for interactive voice response system, meant information relating to computation of data.

[43] **Patents 101(2)**
291k101(2) Most Cited Cases

"Operations of an interface," referred to in patent claims for interactive voice response system, meant processes, activities, or functions of interactive connection between processors upon which system was running, communication facility, and callers; phrase did not require that system be running one of the formats disclosed in the specifications.

[44] **Patents 101(2)**
291k101(2) Most Cited Cases

"Answer data," called for in patent claims for interactive voice response system, meant responses from callers to vocal questions or prompts.

[45] **Patents 101(2)**
291k101(2) Most Cited Cases

"Testing the selected format," called for in patent claims for interactive voice response system, meant method by which it was determined whether any conditions associated with format that had been selected by call data signals were satisfied.

[46] Patents 101(11)
291k101(11) Most Cited Cases

Where plain meaning of method claim language indicates sequential nature to claim steps and specification does not suggest otherwise, steps must be performed in order written in claim.

[47] Patents 101(11)
291k101(11) Most Cited Cases

Basic steps listed in method claims of patents for interactive voice response system, i.e., receiving call data signals, selecting format, testing selected format, and conditionally interfacing, had to be performed sequentially; additional steps listed in claims, however, did not have to be performed in any particular order.

[48] Patents 101(2)
291k101(2) Most Cited Cases

"Call data signals," called for in testing step of patent claims for interactive voice response system, referred to number from which call originated.

[49] Patents 101(2)
291k101(2) Most Cited Cases

"Conditionally interfacing," referred to in patent claims for interactive voice response system, meant connecting call to selected format once any conditions associated with that format had been satisfied.

[50] Patents 101(2)
291k101(2) Most Cited Cases

"Live Operator Attended Terminals," called for in patent claims for interactive voice response system, did not require that prompts displayed at operating stations be identical to vocal prompts used in automated formats.

[51] Patents 101(2)
291k101(2) Most Cited Cases

"Selecting a processing format" step, referred to in patent claims for interactive voice response system, was controlled solely by called number.

[52] Patents 101(2)
291k101(2) Most Cited Cases

"Demographic conditions," referred to in patent claim for interactive voice response system, meant conditions used to limit call based on caller's geographic area.

[53] Patents 101(2)
291k101(2) Most Cited Cases

"Means for directly forwarding," called for in patent claim for interactive voice response system, was limited to disclosed structures which specifically performed function of directly forwarding call from remote terminal to live operator-attended terminal when remote terminal from which caller was calling was not technically capable of digitally providing data. 35 U.S.C.A. § 112.

[54] Patents 101(2)
291k101(2) Most Cited Cases

"First response unit means," called for in patent claims for interactive voice response system, referred to audio response units.

[55] Patents 101(2)
291k101(2) Most Cited Cases

"Qualification means," called for in patent claim for interactive voice response system, was limited to disclosed structures which specifically performed function preliminarily qualifying callers from remote terminals for connection to interface processors, and software required to perform said qualifying. 35 U.S.C.A. § 112.

[56] Patents 101(2)
291k101(2) Most Cited Cases

"Second response unit means for receiving calls in a second call mode," called for in patent claim for interactive voice response system, meant call mode, such as 900 call mode or area code mode, other than 800 call mode.

[57] Patents 165(4)
291k165(4) Most Cited Cases

Whether preamble imposes additional limitation on patent claim depends on whether it is structural or

mere statement of purpose or use of invention.

[58] **Patents 101(2)**
291k101(2) Most Cited Cases

"Means for processing calls in an interface format," called for in patent claim for interactive voice response system, was limited to disclosed structures which specifically performed that function. 35 U.S.C.A. § 112.

[59] **Patents 101(2)**
291k101(2) Most Cited Cases

"Memory means for storing caller cues and use indications," called for in patent claim for interactive voice response system, meant computer hardware that stored questions or prompts which were given to caller.

[60] **Patents 101(2)**
291k101(2) Most Cited Cases

"Means for selecting a current caller cue," called for in patent claim for interactive voice response system, was limited to disclosed structures and associated software which specifically performed function of selecting current caller cue from memory under control of identification signals and use indications. 35 U.S.C.A. § 112.

Patents 328(2)
291k328(2) Most Cited Cases

4,930,150, 5,128,984, 5,255,309, 5,351,285, 5,561,707, 5,684,863. Cited.

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CONCLUSIONS OF LAW REGARDING PATENT CLAIM CONSTRUCTION

LOWELL A. REED, Jr., Senior District Judge.

Ronald A. Katz ("Katz") is the inventor in a large body of patents dealing with telephonic interactive voice applications. The plaintiffs, Ronald A. Katz Technology Licencing, L.P. and MCI Telecommunications Corporation, filed this patent infringement suit against AT & T Corporation, AT & T Universal Card Services Corporation, and AT & T American Transtech, Inc., alleging that the defendants are infringing a number of Katz's patents. In total, over 400 patent claims are at issue in this lawsuit. Because of the complexity and size of the case, the Court ordered that the parties designate a set of approximately seventeen claims to be construed at a *Markman* hearing. The plaintiffs designated twenty claims, including Claims 33, 44, 93, 104, 117, and 192 of the 5,561,707 patent (the '707 patent), Claims ***589** 49, 50, 65, 79, 171, and 190 of the 5,684,863 patent (the '863 patent), Claim 51 of the 5,255,309 patent (the '309 patent), Claim 15 of the 4,930,150 patent (the '150 patent), Claims 17, 20, 24, and 77 of the 5,351,285 patent (the '285 patent), and Claims 4 and 15 of the 5,128,984 patent (the '984 patent).

A *Markman* hearing was held from through June 4, 1999, in which the parties presented expert testimony and oral argument as to the proper construction of the disputed claim language in the twenty claims at issue. The parties also submitted a series of briefs and proposed claim constructions to the Court, all of which were considered by this Court in making the claim constructions that follow. On each claim term to be construed, the parties have submitted many arguments and have pointed to many portions of the intrinsic and extrinsic record in their briefs, in their proposed claim constructions, and in their oral presentations. While the Court has considered all of the arguments and citations of the parties, I may not reiterate all of them in full for each claim term.

I. THE LAW OF PATENT CLAIM CONSTRUCTION

In general, a patent must describe the scope of the patentee's invention so as to "secure to [the patentee] all to which he is entitled, [and] to apprise the public of what is still open to them." *Markman v. Westview Instruments, Inc.*, 517 U.S. 370, 373, 116 S.Ct. 1384, 134 L.Ed.2d 577 (1996) (internal quotation omitted). This is accomplished through the specification of the patent, which should describe the invention in clear terms so that a person in the art of the patent may make and use the invention, and the claims of the patent, which should "particularly poin[t] out and

distinctly clai[m] the subject matter which the applicant regards as his invention." 35 U.S.C. § 112.

[1][2] In *Markman v. Westview Instruments, Inc.,* the Supreme Court, affirming the Court of Appeals for the Federal Circuit, held that construction of patent claims is exclusively within the province of the court to determine as a matter of law. 517 U.S. at 372, 116 S.Ct. 1384. To complete the task of claim construction, a court may draw on the canons of construction that can be sifted from the decisions of the Court of Appeals for the Federal Circuit spanning before *Markman* and beyond. In construing the claims of a patent, a court should consider the claim language, the specification, and, if offered, the prosecution history, which are collectively considered intrinsic evidence of the meaning of the claim terms. *See* *Markman v. Westview Instruments, Inc.,* 52 F.3d 967, 979 (Fed.Cir.1995). As the public record before the Patent and Trademark Office ("PTO") upon which the public is entitled to rely, the intrinsic evidence is the most important source for determining the meaning of claim terms. *See* *Vitronics Corporation v. Conceptronic, Inc.,* 90 F.3d 1576, 1582, 1583 (Fed.Cir.1996). Under some circumstances, a court may also consult evidence extrinsic to the patent, such as technical dictionaries or expert testimony as to how those skilled in the relevant art under consideration would interpret the claims. *Id.*

A. CLAIM LANGUAGE

[3] Because the scope of the rights conveyed to the patentee is defined by the claims, claim construction "begins and ends in all cases with the actual words of the claim." *Renishaw PLC v. Marposs Societa' per Azioni,* 158 F.3d 1243, 1248 (Fed.Cir.1998). In construing the terms of a claim, "the focus is on the objective test of what one of ordinary skill in the art at the time of the invention would have understood the term to mean." *Markman,* 52 F.3d at 987. "Absent a special and particular definition created by the patent applicant, terms in a claim are to be given their ordinary and accustomed meaning." *Renishaw,* 158 F.3d at 1249.

***590** [4] Unless otherwise compelled, a court should give full effect to the ordinary meaning of claim terms, even if the terms are broad. *See* *Johnson Worldwide Associates, Inc. v. Zebco Corporation,* 175 F.3d 985, 989 (Fed.Cir.1999). "General descriptive terms will ordinarily by given their full meaning; modifiers will not be added to broad terms standing alone." *Id.*

[5] The specification, the prosecution history, and in some situations the extrinsic evidence may confirm the ordinary meaning of the claim terms or may provide a special meaning for the claim terms. *See* *Renishaw,* 158 F.3d at 1248. Thus, once a court has determined the ordinary meaning of the claim terms, it must also consider the specification and prosecution history to determine if the patentee used any terms in a manner inconsistent with their ordinary meaning. *See* *Vitronics,* 90 F.3d at 1582.

B. SPECIFICATION

[6][7][8][9] While terms are generally given their ordinary meaning, "[c]laims must be read in view of the specification, of which they are a part." *Markman,* 52 F.3d at 979; *see also* *Phonometrics, Inc. v. Northern Telecom Inc.,* 133 F.3d 1459, 1466 (Fed.Cir.1998)("Although claims are not necessarily restricted in scope to what is shown in a preferred embodiment, neither are the specifics of the preferred embodiment irrelevant to the correct meaning of claim limitations."). The relationship between the claims and the specification is illustrated by the following pair of claim construction canons: "(a) one may not read a limitation into a claim from the written description, but (b) one may look to the written description to define a term already in a claim limitation, for a claim must be read in view of the specification of which it is a part." *Renishaw PLC v. Marposs Societa' per Azioni,* 158 F.3d 1243, 1248 (Fed.Cir.1998). While additional limitations may not be imported into a claim from the specification, a court may construe a limitation specifically recited in a claim in light of the specification. *See* *Phonometrics, Inc. v. Northern Telecom Inc.,* 133 F.3d 1459, 1466 (Fed.Cir.1998). Thus, in order to inject a definition into a claim from the written description, the claim must explicitly contain a term in need of definition. *See* *Renishaw,* 158 F.3d at 1248, 1252 (noting that passages referring to the preferred embodiment cannot be read into the claim without some "hook"). Further, claim terms should not be narrowed by the content of the specification "unless the language of the claims invites reference to those sources." *Johnson Worldwide,* 175 F.3d 985, 990 (noting that there "must be a textual reference in the actual language of the claim with which to associate a proffered claim construction").

[10] The *Johnson Worldwide* court noted two specific situations in which a claim term may be given a definition other than its ordinary meaning: (1) if a patentee chooses to be his or her own lexicographer by explicitly setting forth the definition for a claim term, or (2) if "the terms chosen by the

patentee so deprive the claim of clarity that there is no means by which the scope of the claim may be ascertained from the language used." 175 F.3d at 990. In these situations, reference should be made to the specifications to determine the meaning of the claims.

Because a patentee is free to be his own lexicographer, the specifications may serve as dictionary for certain terms in the claims. *Markman,* 52 F.3d at 979-80. However, in order for a patentee to assign a special definition to a claim term, he or she must do so clearly in the specification. *Markman,* 52 F.3d at 980; *see also* *Renishaw,* 158 F.3d at 1249 (noting that a "patentee's lexicography must, of course, appear 'with reasonable clarity, deliberateness, and precision' before it can affect the claim") (quoting *In re Paulsen,* 30 F.3d 1475, 1480 (Fed.Cir.1994)). "Without an express intent to impart a novel meaning to claim terms, an inventor's claim terms ***591** take on their ordinary meaning." *York Products, Inc. v. Central Tractor Farm & Family Center,* 99 F.3d 1568, 1572 (Fed.Cir.1996); *see also* *Vitronics,* 90 F.3d at 1582 ("Although words in a claim are generally given their ordinary and customary meaning, a patentee may choose to be his own lexicographer and use terms in a manner other than their ordinary meaning, as long as the special definition of the term is clearly stated in the patent specification or file history."). Thus, if a term is used in a variety of ways by the patentee in the specification, this may be indicative of the breadth of the term, rather than a limited definition. *See* *Johnson Worldwide,* 175 F.3d 985, 990-91 (distinguishing *Laitram Corp. v. Morehouse Industries, Inc.,* 143 F.3d 1456, 1463 (Fed.Cir.1998) on the ground that in that case a narrow interpretation was compelled because of unambiguous language in the specification made clear that the claim language had only one interpretation).

As for the second situation discussed in *Johnson Worldwide,* while a court generally construes claim terms consistent with their common meaning, a "common meaning, such as one expressed in a relevant dictionary, that flies in the face of the patent disclosure is undeserving of fealty." *Renishaw,* 158 F.3d at 1250. Also, a court may also resort to the specifications if a claim term lends itself to several common meanings; in such a situation "the patent disclosure serves to point away from the improper meanings and toward the proper meaning." *Renishaw,* 158 F.3d at 1250.

C. PROSECUTION HISTORY

[11][12] The third source of intrinsic evidence that a court may consider in understanding the meaning of the claims is the prosecution history. However, "[a]lthough the prosecution history can and should be used to understand the language used in the claims, it too cannot 'enlarge, diminish, or vary' the limitations in the claims." *Markman,* 52 F.3d at 980 (quoting *Goodyear Dental Vulcanite Co. v. Davis,* 102 U.S. 222, 227, 12 Otto 222, 26 L.Ed. 149 (1880)). A court also may consider the prior art cited in the prosecution history, which may contain clues as to what the claims do not cover. *See* *Vitronics,* 90 F.3d at 1583.

[13][14] If a patentee takes a position before the PTO, such that a "competitor would reasonably believe that the applicant had surrendered the relevant subject matter," the patentee may be barred from asserting an inconsistent position on claim construction. *Cybor Corp. v. FAS Technologies, Inc.,* 138 F.3d 1448, 1457 (Fed.Cir.1998); *see also* *Cole v. Kimberly-Clark Corporation,* 102 F.3d 524, 531 (Fed.Cir.1996) (holding that the patentee was estopped from arguing that her "perforation means" encompassed "ultrasonic bonded seams" after she distinguished references that contained such seams). If a patentee distinguishes a reference on multiple grounds to the PTO, any one of these may indicate the correct construction of a term. *See* *Gentry Gallery, Inc. v. Berkline Corporation,* 134 F.3d 1473, 1477 n. * (Fed.Cir.1998). However, "[u]nless altering claim language to escape an examiner rejection, a patent applicant only limits claims during prosecution by clearly disavowing claim coverage," that is, by making a statement that concedes or disclaims coverage of the claims at issue based on a piece of prior art. *York Products,* 99 F.3d at 1575.

D. EXTRINSIC EVIDENCE

[15][16][17] A court may, in its discretion, consider extrinsic evidence in order to correctly understand and define the language of the claims. *See* *Markman,* 52 F.3d at 980. However, "[e]xtrinsic evidence is to be used for the court's understanding of the patent, not for the purpose of varying or contradicting the terms of the claims." *Markman,* 52 F.3d at 981; *see also* *Vitronics,* 90 F.3d at 1584. Extrinsic evidence may be consulted if the court is not familiar with the terminology of art in which the patent is written, but it should not be ***592** consulted to clarify ambiguity in claim terms. *See* *Markman,* 52 F.3d at 986. "Indeed where the patent documents are unambiguous, expert testimony regarding the meaning of a claim is entitled to no weight." *Vitronics,* 90 F.3d at 1584.

E. MEANS PLUS FUNCTION LIMITATIONS

Paragraph 6 of section 112 of 35 U.S.C. provides that:

> An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.

This provision of the patent statute permits a patentee to write a limitation in a combination claim as a means for performing a function without reciting structure, material, or acts in the limitation. *See Valmont Industries, Inc. v. Reinke Mfg. Co., Inc.,* 983 F.2d 1039, 1042 (Fed.Cir.1993). A patentee who invokes this drafting tool is required, however, to describe in the patent specification some structure which performs the specified function. *See Valmont,* 983 F.2d at 1042.

[18] If a patentee uses the word "means" in a claim, a presumption arises that he or she used the word to invoke § 112, ¶ 6. *See Rodime PLC v. Seagate Technology, Inc.,* 174 F.3d 1294, 1302 (Fed.Cir.1999). There are two ways this presumption may be rebutted: (1) if a claim term uses the word "means" but recites no function which corresponds, or (2) if the claim recites a function but also recites sufficient structure or material for performing the claimed function. *See Rodime,* 174 F.3d 1294, 1302. It is also possible that a claim limitation that does not recite the word "means" may be construed under § 112, ¶ 6, despite a presumption to the contrary. *See Cole v. Kimberly-Clark Corporation,* 102 F.3d 524, 531 (Fed.Cir.1996) (citing *Raytheon Co. v. Roper Corporation,* 724 F.2d 951, 957 (Fed.Cir.1983)).

[19] Even if a mechanism is defined in functional terms, such as a "filter," "brake", "clamp," or "detent mechanism," or if it does not call to mind a single well-defined structure, it may not be subject to means-plus- function analysis. *See Greenberg v. Ethicon Endo-Surgery, Inc.,* 91 F.3d 1580, 1583 (Fed.Cir.1996) (noting that "[d]ictionary definitions make clear that the noun 'detent' denotes a type of device with a generally understood meaning in the mechanical arts, even though the definitions are expressed in functional terms" and that "[i]t is true that the term 'detent' does not call to mind a single well-defined structure, but the same could be said of other commonplace structural terms such as "clamp" or "container" "). In addition, a structural term need not connote a precise physical structure to those of ordinary skill in the art to avoid a means-plus-function analysis, as long as it conveys a variety of structures that are referred to by that term. *See Personalized Media Communications, LLC v. International Trade Commission,* 161 F.3d 696, 704-705 (Fed.Cir.1998) (noting that "detector" was not a generic structural term such as "means," "element," or "device" nor a coined term such as "widget" or "ram-a-fram" in deciding that use of the term "digital detector" did not subject the limitation to § 112, ¶ 6 analysis). The critical inquiry is "not simply that a [mechanism] is defined in terms of what it does, but that the term, as the name for structure, has a reasonably well understood meaning in the art." *Greenberg v. Ethicon Endo-Surgery, Inc.,* 91 F.3d 1580, 1583 (Fed.Cir.1996).

Once the court has determined that a claim limitation is written in means plus function form, the court must define what the "means" are in the claim. The first step is to determine the function that the ***593** claimed means performs. *See Rodime,* 174 F.3d 1294, 1302. The claim language must link the term "means" to a function or the limitation is not subject to 112, ¶ 6. *See York Products, Inc. v. Central Tractor Farm & Family Center,* 99 F.3d 1568, 1574 (Fed.Cir.1996). Next, the court must determine what structure, material, or acts disclosed in the specification correspond to the word "means." *See Chiuminatta Concrete Concepts, Inc. v. Cardinal Industries, Inc.,* 145 F.3d 1303, 1308 (Fed.Cir.1998).

[20][21] In determining the structure disclosed in the specification that corresponds to the means, the court should be wary of importing excess limitations from the specification. For example, if a structure is defined in the specification in a way unrelated to the recited function in the means-plus- function clause, those additional aspects of the structure should not be read as limiting the scope of the means clause. *See Chiuminatta,* 145 F.3d at 1308-1309 (construing a patent for an apparatus and method for cutting concrete, the court held that because the function that corresponded to the means in the limitation was supporting the surface of the concrete, structural aspects of the skid plate in the preferred embodiment that did not perform this particular function were not to be read as limiting the scope of the means clause). In addition, in construing means plus function claims, generally a court should not import a function of a working device or a preferred embodiment into the claims as part of the "means" if such a function is not part of the function recited in the claims. *See Rodime,* 174 F.3d 1294, 1305; *see also Constant v.*

Advanced Micro-Devices, Inc., 848 F.2d 1560, 1571 (Fed.Cir.1988) ("Although the specification may aid the court in interpreting the meaning of disputed language in the claims, particular embodiments and examples appearing in the specification will not generally be read into the claims.").

II. CONSTRUCTION OF THE TWENTY CLAIMS PRESENTED AT THE *MARKMAN* HEARING

The twenty patent claims presented to the Court for construction at the *Markman* hearing may be categorized into the following groups: (1) Analysis Control System Claims, including Claim 51 of the '309 patent, Claims 33, 104, 117 and 192 of the '707 patent, and Claims 49, 50, 65, and 171 of the '863 patent, (2) Claims Involving Products Carrying Participation Numbers, including Claims 44 and 93 of the '707 patent and Claims 79 and 190 of the '863 patent, (3) Conditional Format Claims, including Claim 15 of the '150 patent and Claims 17, 20, 24, 77 of the '285 patent, and (4) Claims from the '984 patent, including Claims 4 and 15.

A. ANALYSIS CONTROL SYSTEM CLAIMS

The first set of claims, the Analysis Control System Claims, come from the '707, '863, and '309 patents. The text and figures of the specifications to these three patents are identical, so references to the specification in one patent are equally applicable to analysis of a term appearing in a claim in another of the three patents. The text of the analysis control system claims at issue is provided in the Appendix to this Memorandum.

In general, the '707, '863, and '309 patents describe a system which interfaces callers at remote terminals through a telephone network to provide voice prompts to the callers so that they can provide information to the system. The information from the callers may be stored in the system for processing. The content of the prompts provided by the system to the callers and the type of processing performed on the information provided by the callers is determined by a format, designed to implement, for example, an auction sale or a contest.

1. "Communication Facility"

[22] The parties have asked the Court to construe the term "communication facility." ***594** [FN1] The plaintiffs argue that although the term does not have a common meaning to one of ordinary skill in the art, [FN2] the meaning is clear from the claim language. The plaintiffs contend that because the purpose of the communication facility in the claims is to connect callers to the interactive voice application ("the Katz system"), the kind of communication facility is inconsequential and the Court should construe the term to mean "any telephone network that enables callers to make calls." (Pls.' Brief at 44-45).

FN1. The parties agree that the term "telephonic [or 'telephone'] communication system" is synonymous with "communication facility" and thus should be construed the same. The Court finds no reason in the claim language, specifications, or prosecution history of the patents which contain these terms to construe the two terms differently.
In addition to Claim 51 of the '309, the term "communication facility" or "telephonic [or 'telephone'] communication system" appears in the following claims: Claims 33, 44, 93, 104, 117 and 192 of the '707 patent, Claims 49, 50, 65, 79, 171, and 190 of the '863 patent, Claim 10 of the '309 patent, Claims 17, 20, 24, and 77 of the '285 patent, and Claim 15 of the '984 patent. There being no indication to the contrary, the Court concludes that these terms have one meaning across all the patent claims at issue in the *Markman* hearing.

FN2. Both Mr. Morganstein, the expert for the plaintiffs, and Professor Larky, one of the experts for the defendants, testified that a person of ordinary skill in the art of interactive voice response systems would have had at least a Bachelor's degree in a scientific or engineering field, such as physics, electrical engineering, or computer science, and at least two years experience working in the field of computer telephony. (Transcript volume 1 at 77-78; volume 3 at 39).

The defendants attack this proposed construction of communication facility and argue that the Court should construe the term as requiring that (1) the communication facility comprise the entire Public Switched Telephone Network ("PSTN") [FN3] and (2) the Katz system must be operated only outside the PSTN or communication facility. To support their argument that the communication facility comprises the entire PSTN, the defendants point to particular

language in the specifications that they contend supports such a construction. First, the defendants point to Column 3 of the '707 patent at line 13, which provides that "[i]n the disclosed embodiment, the remote terminals T1 through Tn represent the multitude of conventional telephone terminals that are coupled to a communication facility C which may take the form of a comprehensive public telephone system for interconnecting any associated terminals T1-Tn." Because the specification indicates that the communication facility has the ability to connect *any* associated terminals (such as telephones), the defendants argue that the communication facility must include the entire PSTN. Similarly, the defendants argue that Katz defined communication facility as the entire PSTN in line 63 of Column 4 of the '707 patent, which provides that "DNIS capability is a function of the communication facility C (composite telephone system)." The defendants maintain that these passages of the specification indicate that the communication facility should be construed to mean the entire PSTN.

> FN3. Professor Larky defined the PSTN as the comprehensive public telephone system which "includes the operations of the various local exchange carriers (such as Bell Atlantic), and interexchange (long distance) carriers, such as AT & T and MCI." (Expert Report of Larky at 14). Although, the Court did not need to draw on expert testimony to construe the meaning of the term "communication facility," reference to the expert's report to understand the meaning of the term PSTN is essential to understanding the defendants' argument.

The plaintiffs argue that the passages relied on by the defendants do not support their construction and that the specification indicates a contrary definition of "communication facility." In Column 17 of the '707 patent, Katz states that callers to his system could be billed through the "pay-to-dial network." The plaintiffs argue that this indicates that "communication facility" may comprise any part of the ***595** PSTN, including the pay-to-dial network, that allows calls to be made by a caller to the Katz system and does not require that it comprise the entire PSTN. In addition, the plaintiffs contend that the prosecution history supports this construction. In a Preliminary Amendment dated January 10, 1986 in the prosecution of the '299 patent, Katz amended his claims to replace the term "public communication facility" with the term "communication facility." (Ex. 26). Katz also added a claim during the prosecution of the '299 patent, claim 15, which provided: "A system according to claim 1 wherein said communication system comprises a public communication system." (Ex. 26). By altering his claims, the plaintiffs argue, Katz clearly did not limit his claims to *always* require use of the entire PSTN.

This Court concludes that the claim language does not shed much light on the scope of the communication facility; however, there is no indication from claim language itself that the communication facility must include the entire PSTN. The specification is more helpful in determining the scope of the term at issue. In Column 3, lines 55-59 of the '707 patent, Katz states that "[i]n the illustrative embodiment of the system, the communication facility C comprises a public telephone network." This indicates that the communication facility may, but is not required to involve the entire PSTN. In addition, the prosecution history of '299 patent cited by the plaintiffs, in which Katz removed the word "public" from modifying "communication facility," is consistent with this indication. The references to the specification made by the defendants do not undermine this reading of the claim language and specification and do not lend support to the defendants' proposed construction of this term. Thus, I conclude that in light of the claim language, specifications, and prosecution history presented by the plaintiffs, the term "communication facility" does not require the involvement of the entire PSTN or thus, all of its elements and processes.

To support their argument that "communication facility" is defined in the patents such that the Katz system must be operated only *outside* the PSTN or communication facility, the defendants point to the language of the preamble and claim limitations. The parties agree that because the terms "communication facility" and "analysis control system," which initially appear in the preamble, are referred to in the claim limitations, these terms should be considered as limitations in the claims. *See* *Gerber Garment Technology, Inc. v. Lectra Systems, Inc.,* 916 F.2d 683, 689 (Fed.Cir.1990). The preamble provides for "[a]n analysis control system for use with a communication facility;" the defendants contend that this language, particularly the word "with," indicates that the Katz system, the analysis control system, is necessarily outside of the network. Further, the defendants argue that because the preamble indicates that the communication facility provides call data signals to the Katz system, this indicates that Katz was not referring to the internal routing signals that

occur inside the telephone network.

Turning to the language of the claim limitations, the defendants point out that Katz used the phrase "coupled to said communication facility," which they argue indicates that the Katz system is something distinct from the communication facility because it is "coupled to" it. The defendants also contend that the limitation "interface structure coupled to said communication facility ... including means to provide signals representative of data developed by said remote terminals and for receiving said calling number identification data and said called number identification data (DNIS) to identify one from a plurality of called numbers" indicates that the interface structure cannot be a switch inside the PSTN, because switches *send* ***596** DNIS, not receive it. [FN4] This, the defendants argue, is further proof that the Katz system cannot include any elements or processes which are inside the PSTN.

FN4. This limitation is not present in Claim 51 of the '309 patent, but it and similar limitations appear in other claims in which the term "communication facility" is used. *See, e.g.,* Claim 171 of the ' 863 patent (dependent on Claim 93 of the '863).

In addition, the defendants refer the Court to Figure 1 in the specification. First, the defendants argue that the Katz system is represented as a "dead-end" or the place at which a call terminates, not as a mechanism by which calls are connected from one person to another, as is the function of the PSTN. Second, the defendants argue that pursuant to the Code of Federal Regulations, if an aspect of the invention is represented in the figure as a rectangular box, it indicates that that aspect is not essential to the understanding of the invention, citing 37 C.F.R. § 1.83(a). Thus, the defendants argue, the fact that the communication facility is represented in the figure as an empty box lends support to their position that the Katz system must be operated only outside the network.

Finally, the defendants point to the specification of the '707 patent at Column 6 at line 14, which provides that "individual callers would use the remote terminals T1-Tn to contact the central station D through the communication facility," as indicating that by using the word "through," Katz indicated that the Katz system must be operated only outside the PSTN.

The plaintiffs argue that the claim language is silent as to whether the Katz system must function only "inside" or "outside" the network. Further, the plaintiffs argue that there is nothing in the specification that requires that the Katz system function only outside the network. The plaintiffs maintain that although the communication facility is represented in Figure 1 as an empty box, certain parts that the defendants would consider to be "inside" the PSTN, such as the remote terminals and customer billing, are split out and shown as separate boxes in Figure 1. Thus, the plaintiffs contend that if customer billing and the remote terminals can be shown as separate empty boxes and still be "inside" the PSTN, there is no basis in Figure 1 for construing the Katz system, which is also represented by separate boxes, as "outside" the PSTN.

The Court concludes that there is no basis in the claim language, the specifications, or in Figure 1 to construe the term "communication facility" to mean that the Katz system must be operated only outside the communication facility. It appears that the essence of the defendants' argument here is that the Katz system cannot run on any of the equipment that is part of the communication facility, and thus, is "outside" of the communication facility. The Court is not persuaded that the words "for use with," "through" or "coupled to" indicates that the Katz system must be operated only outside the communication facility. The words "with," "through," and "coupled to" connote some type of relationship between two things; however, none of these terms means that the two things in the relationship cannot be considered part of the same system or entity.

Finally, the defendants argue that, claim language and specification aside, Katz clearly limited his invention to a system only existing outside the communication facility in his representations to the PTO during the prosecution of his patents. The defendants point to comments by Katz during the prosecution of the '707 patent regarding patents to DeBruyn, Riskin, Comella, and Daudelin. Specifically, the defendants point out that in an Amendment dated August 31, 1995, Katz stated that he amended his claim to recite "that processing of at least certain of the data developed by the terminals and the calling number identification data occurs in the Applicant's system" and that "[n]either DeBruyn nor Riskin teach this aspect of the Applicant's system, also neither patent ***597** teaches calling number identification data provided automatically by a communication system (for example, ANI or like signals)." (Ex. 51).

In addition, the defendants point out that in the same Amendment, Katz noted in part that Comella's system "replaces the function of an operator for certain types of calls, for example, collect calls, person-to-person calls, charge-to- third number calls and so on" and that the patent to Comella "is somewhat of background interest for its interface aspects." (Ex. 51). As for the patent to Daudelin, the defendants point out that Katz described it as "generally directed to an interface arrangement for reducing the load on telephone operators." (Ex. 51). Apparently, the defendants contend that if Katz had contemplated that his system could have operated inside the PSTN, he should have said a lot more than he did to adequately distinguish his invention from the Daudelin and Comella patents, which were inventions that were operated by the PSTN.

Whether Katz complied with his obligations before the PTO, however, is a question for another day; the question before the Court is whether Katz made any statements to the PTO that limited the scope of his claims. Considering the passages of prosecution history flagged by the defendants, the answer to that question is no: The Court concludes that the statements by Katz regarding these patents do not constitute a representation from him to the PTO that his invention could be operated only "outside" the communication facility.

Further, the defendants point to statements made by Katz to the PTO in the September 19, 1994 Supplemental Information Disclosure Statement ("IDS") during the prosecution of the '575 patent, which occurred while the application of the '707 patent was still being prosecuted. Specifically, the defendants point to a passage in which Katz referred to a patent by DeBruyn and stated in part that the patent to DeBruyn "discloses a lottery system that is integral with the 'Telephone Company,' " and that in Katz' system, "the 'Telephone Company' ('a communication facility') simply provides an interface, the lottery system being a separate and distinct capability." (Ex. 41). However, taking the statements highlighted by the defendants in context, Katz points out differences between his system and the DeBruyn system including that in Katz system the caller must enter "lottery and identification data," while in the DeBruyn system, the caller need not enter such information because the system is run inside the "Telephone Company" where the callers' telephone number is already known. These statements highlight that the Katz system requires that a caller enter certain data, which is not required by the DeBruyn system; the statements do not limit the physical or geographic location where the Katz system can or cannot operate.

Similarly, the defendants refer to another piece of prosecution history in which Katz discussed a patent to DeBruyn for a telephonic lottery system. (Ex. 46). In the September 30, 1994 IDS in the prosecution of the '120 patent, [FN5] Katz stated that DeBruyn was distinct from his system which received identification from a caller because the it was "integrated with the composite telephone system which could identify the subscriber's telephone number." The Court concludes that the statements of Katz in the September 19, 1994 Supplemental IDS and the September 30, 1994 IDS do not restrict or limit the term "communication facility" to mean that the Katz system must be operated only outside of it.

FN5. The '120 patent is related to the patents-in-suit; the defendants cite to this prosecution history because the claims at issue contain language regarding the communication facility which is similar to the patents before the Court. (Defs.' Brief at 34 n. 20).

The defendants argue that Katz also distinguishes his system from the routing and connection of telephone calls, which ***598** are integral functions of a telephone company, thereby establishing that his system was to operate only outside the network. The defendants point to a statement made by Katz regarding a patent to Riskin in the prosecution of the '075 patent. (Ex. 40). In the Preliminary Amendment dated July 17, 1990, Katz stated that "[r]ecognizing that the Riskin patent discloses the utilization of ANI and DNIS signals to accomplish telephone routing, it is respectfully submitted that applicant's system involves entirely different philosophical considerations and structure." The defendants contend that because the Riskin patent was a system that was inside the telephone network, this statement by Katz indicates that his system was to be operated outside the PSTN. Similarly, the defendants argue that Katz distinguished his invention during the prosecution of the '929 patent [FN6] from a patent to Riskin by stating that his invention was outside the PSTN. (Ex. 37). In the Amendment dated August 1, 1990, Katz noted that in the Riskin patent, "functions are involved that are completely distinct from applicant's system.... Specifically, Riskin does not disclose an interface telephone system but rather discloses a connection system." The Court concludes that in these statements, however, Katz is

discussing functional differences between the Riskin system and his system, not differences in the physical or geographic location of the elements of the systems.

FN6. The '929 patent is a direct descendant of the '299 Application, from which all the patents-in-suit descend.

Essentially, the defendants are attempting in their arguments regarding "communication facility" to put a non-infringement rabbit in their hat at the claim construction stage of the case; in their arguments, they expressly seek to include any and all of their equipment, wires, switches, computers, trunks, lines, databases, and so on in the definition of "communication facility" and then establish that the Katz system cannot by definition include any of those things or run on any of that equipment because his system must be "outside" the communication facility. The result of adopting such reasoning would be to restrict the definition of "communication facility" on the basis of who owned the computer or switch on which the Katz system was running or on the basis of the physical or geographic location of the particular computer or switch. The plain words of the patents will not support such a restricted definition.

Based on the foregoing inspection of the claim language, specification, and prosecution history, the Court construes the term "communication facility" in the Katz patents to mean: that part of a telephone network that enables a caller to connect to the Katz system. The Court concludes that there is no support for a construction of "communication facility" to require that the Katz system be operated only outside the entire PSTN nor that the "communication facility" encompass the elements or processes of the entire PSTN.

2. Application of Means-Plus-Function Analysis

The analysis control system claims contain several limitations that contain a "structure" or "means" term, such as "interface structure," "voice generator structure," and "means to provide call data signals representative of data developed by said remote terminals." While the parties agree that some of these terms are subject to means-plus-function analysis under 35 U.S.C. § 112, ¶ 6, the plaintiffs dispute the application of such analysis to other terms.

a. "Interface Structure"

[23] The first of these terms the parties wish the Court to construe is "interface structure." [FN7] The claim limitations in *599 which this term appears read "an interface structure coupled to said communication facility to interface said remote terminals for voice and digital communication." In some of the claims, the limitation goes on to provide that the interface structure includes "means to provide caller data signals representative of data relating to said individual callers developed by said remote terminals." [FN8] Other claims contain limitations which further provide that the interface structure includes means "for receiving said calling number identification data." [FN9]

FN7. The term "interface structure" appears in the following claims under consideration at the *Markman* hearing: Claim 51 of the '309 patent, Claims 33, 104, 117 and 192 of the '707 patent, and Claims 49, 50, 65, and 171 of the '863 patent.

FN8. Claims which include this or similar language are Claims 51 of the '309 patent, Claims 104 and 117 of the '707 patent, and Claims 49, 65, and 171 of the '863 patent.

FN9. Claims which include this or similar language are Claims 104, 117, and 192 of the '707 patent and Claims 49, 65, and 171 of the ' 863 patent.

The dispute between the plaintiffs and the defendants centers around whether "interface structure" is subject to means-plus-function analysis under 35 U.S.C. § 112, ¶ 6. The plaintiffs maintain that the term does not implicate § 112, ¶ 6 and should be construed to mean "a hardware device with associated software that establishes an interactive connection between a caller's telephone and a computer system." (Pls.' Brief at 50). The plaintiffs argue that under *Personalized Media Communications, LLC v. International Trade Commission*, 161 F.3d 696, 704-705 (Fed.Cir.1998), a term that is defined in terms of its function or that does not bring to mind one well-defined structure is not necessarily subject to means-plus-function analysis. In *Personalized Media*, the Court of Appeals for the Federal Circuit held that the term "digital detector" was not subject to means-plus-function analysis because it conveyed to one of ordinary skill in the art "a variety of structures known

as detectors." Id. at 705. The plaintiffs argue that the term "interface structure" is akin to "digital detector" in that it is a sufficient recitation of structure so as to avoid the application of means-plus-function analysis. The plaintiffs argue that a specific set of structures corresponding to "interface structure" was known to those of ordinary skill in the art at the time of the prosecution of the Katz patents.

The defendants argue that the term "interface structure" is written in functional language, fails to sufficiently connote structure to those of ordinary skill in the art, and as such, it subject to analysis under § 112, ¶ 6. The defendants contend that Katz simply used the term "structure" instead of "means" to attempt to avoid the application of § 112 ¶ 6. The defendants maintain that "interface structure" is a generic term which does not inform a person of ordinary skill in the art what structure is being conveyed by the term.

[24] Because the term "interface structure" is not drafted in "means for" form, the Court presumes that it is not subject to the requirements of § 112 ¶ 6. *See* Mas-Hamilton Group v. LaGard, Inc., 156 F.3d 1206, 1213 (Fed.Cir.1998). The critical factor in determining whether a term in a limitation which does not invoke "means for" language is subject to means-plus- function analysis despite the presumption to the contrary is whether the term brings to mind a set of structures to those of ordinary skill in the art, and not whether the term is written in functional language. *See* Personalized Media, 161 F.3d at 704-705. To determine whether this term would connote sufficient structure to those of ordinary skill in the art, this Court must refer to references in the computer telephone field contemporary with the prosecution of the Katz patents. *See* Greenberg, 91 F.3d at 1583 (consulting dictionaries to determine that the term "detent" denoted a device generally understood to those in the mechanical arts).

***600** In an article in the AT & T Technical Journal regarding the Conversant 1 Voice System, [FN10] "trunk interface units" are described as connecting incoming trunks from a central office in the telephone network, and "line interface units" are described as initiating or receiving calls over ordinary telephone lines. (Ex. 366). In an 1985 article entitled "The AT & T Multi- Mode Voice SystemsFull Spectrum Solutions for Speech Processing Applications," the authors refer to "telephone interface units (either line or trunk circuits)" as being a component of a basic system for speech processing applications using the telephone network and centralized databases. (Ex. 358). Other references in the record indicate that "interface structure" connoted structure to those of ordinary skill in the art: Exhibit 355, an article regarding Periphonics Voicepac, describes a particular brand of device used as an interface; Exhibit 405, a 1986 article on the Conversant 1 Voice System, discusses the function of line and trunk interfaces; Exhibit 250, the 4,866,756 patent to Crane et al., incorporates a "telephone interface component" to transmit audio response signals; and Exhibit 235, the 4,797,911 patent to Szlam et al., incorporates "trunk interface units" into its customer account online servicing system.

FN10. The date of this article is unclear in the record, but there is some indication in the article that the manuscript was revised in 1986.

One technical dictionary cited by the plaintiffs was helpful in assisting the Court determine what "interface structure" meant to those in the art. In the *Dictionary of Computing and New Information Technology* by A.J. Meadows, et al. (1982), the term "interface" is defined as being "[u]sed as a general term to describe the connecting link between the two systems. Most frequently refers to the hardware and software required to couple together two processing elements in a computer system." (Ex. 481).

While the testimony of the experts at the *Markman* hearing is not as weighty as prior art and technical references in determining the state of the art at the time of the prosecution of the Katz patents, it is consistent with the above references in indicating that "interface structure" had meaning and brought to mind a set of structures to those in the field. *See* Morganstein Testimony, Transcript Volume 1 at 173, line 24 to 176, line 2 (testifying that the term "interface structure" would have had meaning to a person of ordinary skill in the art who had read the Katz patents and would have brought to mind a range of structures such a person could have used to build the Katz inventions); Larky Testimony, Transcript Volume 3 at 64 lines 12-15 (testifying that he recognized that the term "interface structure" referred to "some physical structure" but not a specific structure).

Based on the above references and expert testimony, the Court concludes that although the term "interface structure" is written in functional language, the limitation sufficiently connotes structure such that §

112, ¶ 6 does not apply. That is, I conclude that, based on the cited prior art, references, and testimony of the experts at the *Markman* hearing, the term "interface structure" would have called to mind a specific set of structures to a person of ordinary skill in the art such that such a person would be able to build the Katz inventions.

Having concluded that the term "interface structure" is not subject to § 112, ¶ 6, the Court must construe the meaning of the term according to the regular rules for claim construction. The meaning of "interface structure" to those of ordinary skill in the art at the time has been discussed above. In addition, in Column 4, line 52 to Column 5 line 15 of the '707 patent, Katz discusses the function and components of the interface structure and states that "the interface 20 incorporates modems, tone decoders, switching mechanisms, DNIS and ANI capability (call data analyzer 20a) ***601** along with voice interface capability" and that the "interface 20 provides the connection of the first lines to a switch 21 which are in turn coupled to first function units, or processors PR1 to PRn." This description of the interface in the specification is consistent with the ordinary meaning of the term "interface structure" to those of skill in the art. Based on the foregoing, I construe the term "interface structure" in the Katz patents to mean "the hardware and software required to connect the processors upon which the Katz system is running to the communication facility such that information from the communication facility and the remote terminals may be provided to and received by the Katz system." For the claims listed in footnote 8, *supra,* the Court construes the term "interface structure" to also include the means to perform the specific function of providing caller data signals representative of data developed at the remote terminals. For the claims listed in footnote 9, *supra,* the Court construes the term "interface structure" to also include the means to perform the specific function of receiving calling number identification data.

b. "Means to Provide Caller Data Signals" and "Means to Receive Calling Number Identification Data"

[25] Some of the limitations beginning with the term "interface structure" contain terms drafted in "means for" language, including "means to provide caller data signals" in Claims 51 of the '309 patent, Claims 104 and 117 of the '707 patent, and Claims 49, 65, and 171 of the '863 patent, and means "to receive calling number identification data" in Claims 104, 117, and 192 of the '707 patent and Claims 49, 65, and 171 of the '863 patent. [FN11] Both sides agree that these terms are subject to means-plus- function analysis. The plaintiffs argue that the structure that corresponds to the "means" in "means to provide caller data signals" is the Interface 20 in Figure 1 or Interface 1A sub1 through 1A subN and 1B sub1 through 1B subN in Figure 9 of the '309, '707, and '863 patents. The plaintiffs argue that the structures in Figure 1 that correspond to the "means" in "means to receive calling number identification data" are the Interface (20) and the Call Data Analyzer (20a). The defendants argue that the "means" in both of these means- plus-function limitations corresponds to the structures referenced by the plaintiffs but also corresponds to the Automatic Call Distributor ("ACD").

FN11. Some of the claims contain slight variations on this language, but the Court concludes the meaning of the various phasing of this concept is the same.

The Court concludes that the phrases "means to provide caller data signals" and "means for receiving said caller number identification data" are written in "means for" form, do not recite sufficient structure in the claim language, and are subject to analysis under § 112, ¶ 6. According to the specification of the '707 patent at Column 4, lines 28-31, the ACD functions to "queue incoming calls for connection to a lesser number of lines." The ACD does not fulfill and is not necessary to the function of providing call data signals or receiving calling number identification data and thus does not correspond to the "means" in those limitations. The Court concludes that the structure disclosed in the patents that corresponds to the "means" in the "means to provide caller data signals" is the Interface 20. The Court concludes that the structures disclosed in the patents that correspond to the "means" in "means for receiving calling number identification data" are the Interface 20 and the Call Data Analyzer 20a.

c. "Voice Generator Structure"

[26] The term "voice generator" appears in several of the analysis control system claims at issue, and the limitations containing this term read "voice generator structure coupled through said interface structure for actuating said remote terminals as to provide vocal operating instructions ***602** to said individual callers." [FN12] The parties agree that the term "voice generator structure" is not subject to means-plus-function analysis because the term connotes a

specific range of structures that correspond to the term to those of ordinary skill in the art. The Court concludes that the plain meaning of the term "voice generator" indicates a structure that can produce vocal sounds. The specification of the patents in which this term is found describes the voice generator structure as "a voice origination apparatus may prompt individual callers who (after qualification) provide select digital data to develop a record for further processing." Column 2 lines 4 to 8 of the '707 patent. The specification also provides that the voice generator is incorporated in the interface, Column 4, lines 55 to 58 of the '707 patent, and that "recorded voice messages prompt callers to provide data by actuating the alphanumeric buttons"on their telephones, Column 1, lines 45 to 47 of the '707 patent. Based on the term's ordinary meaning, the claim language, and the specification, the Court concludes that "voice generator" means: a device for generating vocal instructions or prompts to individual callers at the remote terminals.

FN12. The term "voice generator structure" is found in Claim 51 of '309, Claims 33, 104, 117, and 192 of the '707 patent, and Claims 65 and 171 of the '863 patent. In Claim 192 of the '707 patent, the limitation provides that the voice generator structure is also able "to prompt said individual callers to enter data."

d. "Record Structure"

[27] The term "record structure" begins limitations in many of the Analysis Control System Claims at issue; the limitation in Claim 51 of the '309 patent reads "record structure, including memory and control means, connected to receive said caller data signals from said interface structure for updating a file and storing digital caller data relating to said individual callers provided from said digital input means through said interface structure." [FN13]

FN13. The term "record structure" appears in the following claims: Claim 51 of the '309 patent, Claims 33, 104, 117, and 192 of the '707 patent, and Claims 49, 50, 65, and 171 of the '863 patent. The wording of the record structure limitations varies across these claims; however, all include "memory and control means" and the concept of receiving information about callers from the interface structure or the communication facility and then storing, updating, accessing, or testing that information. Thus, the definition of the term "record structure" will be the same across the claims at issue in which it appears.

The plaintiffs argue that "record structure" is not subject to means-plus- function analysis because the term connotes structure to those of ordinary skill in the art. Morganstein testified at the *Markman* hearing that a person of ordinary skill in the art who had read the Katz patents would have understood "record structure" to refer to a set of structures; Morganstein testified that the record structure would correspond to one of the building blocks of interactive voice applications, including processors, memory, and software. (Transcript volume 1 at 181-182). Larky did not disagree with Morganstein and testified that "record structure" would have connoted structure to those in the field. (Transcript volume 3 at 67-68). The plaintiffs also argue that the phrases "including memory" [FN14] and "connected to receive said caller data signals from said interface structure" are additional structural descriptions of record structure in the claims which support their position that the term does not implicate § 112, ¶ 6. The plaintiffs' proposed construction of this term is "a hardware device with associated ***603** software, including memory and control means, used to store information." (Pls.' Appendix at 132).

FN14. It appears that both sides agree that the term "memory" does not implicate § 112, ¶ 6. Morganstein testified at the *Markman* hearing that a person of ordinary skill in the art would have been aware of many kinds of "memory," such as RAM, tapes, cassettes, and disks. *See* Morganstein Testimony, Transcript volume 1 at 106. Thus, the Court construes the term "memory" according to its plain meaning as: computer hardware that stores information, such as disks, RAM, or tapes.

The defendants argue that "record structure" is subject to § 112, ¶ 6 because the term is defined by the function it performs--accessing a file and storing data--and because it lacks a sufficiently definite structure to those of ordinary skill in the art. The structures that correspond to this term, the defendants argue, are the Processing Unit 92, Memory 98 with storage cells C1 through Cn in Figure 4, and the required wiring to connect these structures together.

The defendants argue that "record structure" also corresponds to the required software for performing the disclosed functions. The defendants contend that the only software programs disclosed in the specifications are in the context of the specific "formats" described by Katz, such as game shows, lotteries, and auctions. [FN15]

FN15. The defendants argued as well on other claim terms that the structures corresponding to the means in mean-plus-function limitations included software that was particularly programmed to carry out one of the seven formats disclosed in the specifications or to perform "statistical analysis to isolate a subset." In support of this argument, the defendants submitted the recent case of *WMS Gaming Inc. v. International Game Technology*, 184 F.3d 1339 (Fed.Cir.1999) after the close of the *Markman* hearing. Upon full consideration of the *WMS Gaming* case and the letters submitted to the Court by the parties regarding this issue, the Court concludes that the new decision by the Federal Circuit does not require that the software corresponding to the means in these limitations be specifically programmed to perform one of the seven formats disclosed in the specifications or statistical analysis to isolate a subset of callers or data.

Based on contemporary technical dictionaries and the testimony of the experts, the Court concludes that the term "record structure" is not subject to § 112, ¶ 6 because the term would have connoted sufficient structure to those of ordinary skill in the art. The Court construes the term "record structure" to mean: computer hardware and software required to receive data signals, update files, and store information.

The limitations containing the term "record structure" provide that the record structure includes memory and "control means ... for accessing a file." The parties agree that "control means" is subject to § 112 ¶ 6. The plaintiffs point to the Processing Unit 92 and Memory 98, including cells C1 through Cn in Figure 4 or Processors PR1 through PRn in Figure 1 as the structures that correspond to "control means." The plaintiffs contend that an alternative structure for control means disclosed in the patents is a microcomputer or microprocessor, such as the Central Processing Unit 251 in Figure 9, programmed to perform the disclosed functions.

The defendants agree that the term "control means" corresponds with the structures the plaintiffs have identified, but the defendants contend that the term also must include the associated wiring and software.

The first step in means-plus-function analysis is to identify the function performed by the means; here, the function of the "control means" is to receive calling number identification data, to access a file, and to store data relating to certain of said individuals callers. The Court concludes that the patent discloses that the control means correspond to the Processing Unit 92 and Memory 98, including the cells, C1 through Cn in Figure 4 and the Processors PR1 through PRn in Figure 1. *See* Column 16, lines 24-28, and 44-46 of the '707 patent and Column 18, lines 21-25 of the '707 patent. In addition, "control means" corresponds to the software that enables these structures to perform the functions of receiving and storing data and accessing files. The Court concludes that the control means also correspond to a microprocessor, such as the Central Processing Unit 251 in Figure 9, programmed to perform the disclosed functions, as such a structure can also perform the disclosed ***604** functions of the control means. *See* Column 5, lines 12-33, Column 9, lines 59 to 67, and Column 21, lines 9-20 of the '707 patent.

The core dispute between the parties in relation to the record structure limitations is over the meaning of the term "accessing." The plaintiffs argue that the term "accessing" includes anything a computer can do to a file, such as creating or opening records or storing additional information entered by callers. The defendants argue that the term "accessing" does not encompass deleting a file or creating or initiating a file because a file must exist before it can be "accessed." The defendants point to passages of the specification in which the ideas of updating a file are distinct from creating a cell in memory in the first instance. *See* Column 12, line 63-65, Column 16, lines 29-32, and Column 17, lines 29-30 of the '707 patent. Thus, they contend that the term "accessing" must mean retrieving a file that already exists.

In Claim 51 of the '309 patent, Katz recites a "record structure, including memory and control means, ... for *updating* a file." This indicates to the Court that the use of the word "accessing" in a similar limitation in another claim connotes a different meaning. Further, although Katz describes updating files and assigning cells in memory as different functions in the specification, there is nothing in the specification that indicates that the term "accessing" could not

encompass both of those functions.

Webster's Dictionary defines the verb "access" as "to get at, gain access to." Addenda to *Webster's 3rd New International Dictionary* at 55a (1986). As a noun, the term is defined as "permission, liberty, or ability to enter, approach, communicate with, or pass to and from" or "freedom or ability to obtain or make use of." The Court concludes that the term "accessing" means in the context of the Katz patents: gaining or obtaining the ability to enter or make use of files. The Court further concludes that the term "accessing" in the context of the Katz patents does not delineate or restrict the types of functions that may be performed on the files once they are accessed, such as updating files, creating new files, or deleting files.

e. "Qualification Structure"

[28] "Qualification structure" appears in many of the Analysis Control System Claims, and the limitations in which this term appears vary from claim to claim. [FN16] Claims 104 and 117 of the '707 patent and Claim 171 of the '863 patent include the broadest limitation including the term, providing for a "qualification structure controlled by said record structure for controlling access to said system by said individual callers." The other limitations containing this term vary on how and on what basis access to the system is controlled.

FN16. The term "qualification structure" appears in Claim 51 of the '309 patent, Claims 33, 104, and 117 of the '707 patent, and Claims 49, 50, 65, and 171 of the '863 patent.

The plaintiffs argue that this term is not subject to means-plus-function analysis because the term "qualification structure" was well known to those of ordinary skill in the art of building interactive voice applications. The plaintiffs contend that "qualification structure" would have brought to mind a computer processor and its software programs to those of skill in the art.

The defendants argue that this term is subject to means-plus-function analysis because it is written in functional terms and has no meaning to those of ordinary skill in the art without more information than is provided in the claim language. The defendants argue that the term does not escape application of § 112, ¶ 6 because it calls to mind a computer processor and its programs, as plaintiffs contend. The defendants argue that the structure in Figure 4 that corresponds to this term is the Qualification Unit 93, the Processing Unit 92, the Memory 98, and the software required to qualify callers. *See* Column 6, ***605** line 56 to Column 7, lines 36 and Column 16, lines 19-31 of the '707 patent. The defendants contend that the only software that is disclosed in the patents is in the context of the specific formats discussed by Katz, such as game shows, lotteries, and auctions.

The Court concludes that although the term "qualification structure" does not include the term "means," it is subject to § 112, ¶ 6. "Qualification structure" is written in functional terms and the Court is not convinced that it would not have brought to mind sufficient structure to a person of ordinary skill in the art without further reference to the specification. The function performed by the "qualification structure" is controlling access to the Katz system by individual callers. The structures disclosed in the specification that perform this function are the Qualification Unit 93 and the Processor 92 in Figure 4. [FN17]

FN17. For the term "qualification structure" in Claim 33 of the '707 patent, which provides for "[a]n analysis control system according to claim 26, wherein said limit on use restricts relates to a dollar amount," the defendants claim that the corresponding structures are the Qualification Unit (93) and Look-up Table (99) or Use Rate Calculator (100) in Figure 4, as well as the software required to perform the function of testing the data from callers to specify a basis for entitlement to assess to the Katz system. *See* Column 17, lines 38-62 of the '707 patent. The Court concludes that these structures designated by the defendants correspond to the qualification structure in Claim 33 of the '707 patent.

The qualification structure limitations raise additional construction issues. In Claims 49 and 50 of the '863, the qualification structure controls access to the Katz system "based on at least two forms of distinct identification including caller customer number data and at least one other distinct identification data element consisting of personal identification data." The parties agree that a "caller customer number" is a number that is assigned to a merchant's own customer; however, the defendants

contend that the caller customer number cannot be a credit card number because it is not assigned from a vendor to a customer. The defendants point to Column 11, lines 6-7 of the '863 patent, which describes the customer number in a mail order format as the number found on the customer's catalog. Thus, the defendants argue the customer number cannot be a credit card or charge number because such a number does not identify the caller as a customer of the merchant. In Column 11, lines 19-22 of the '863 patent, Katz states that a caller's customer number may be stored along with his credit card number and expiration date; the defendants argue that this indicates that a customer number and a credit card number are two separate items.

The defendants also argue that the second piece of identification data cannot be a personal identification number (PIN) or an expiration date from a credit card because such numbers are not unique to the individual, or "personal," without the corresponding credit card number or calling card number. The defendants point out that in Column 11, lines 1-5 and 19-22 of the '863 patent, Katz describes "other distinct identification data" in the mail order format as both a credit card number and its expiration date.

Along with the specification, the defendants point to the prosecution history of the '707 patent as support for their construction of "caller customer number data" and "other distinct identification data." In the May 8, 1995 Office Action during the prosecution of the '707 patent, the examiner rejected pending Claim 33, which provided for a "record structure with means for recording an identification card number and at least one other distinct identification data element," as unpatentable over the '554 patent to Asmuth. The examiner noted that Asmuth contained the "record structure" of Katz's claim and taught "that input 'caller data signals' may include a telephone credit card number (in the claim 'identification card number') ... and a 'distinct identification data element' consisting of 'personal identification data' (in the patent *606 a 'PIN')." Katz subsequently amended what was then Claim 33 to recite a qualification structure in a form similar to the claims at issue. *See* August 31, 1995 Amendment. In his comments to that amendment, Katz stated that he added a "qualification structure" requiring two forms of distinct identification including a caller's customer number to qualify a caller, and that the addition of the qualification structure and the fact that Asmuth stored data to define the virtual private network while his invention stored data developed by the callers rendered the Katz invention distinct.

As for the term "caller customer number data," the claim language does not support the narrow construction proposed by the defendants. That is, there is no support in the claims for the notion that this form of identification could not be a credit card or other charge number if such a number identified the caller as a customer of a particular merchant or vendor. The mention in the specification of storing the customer number as distinct from the credit card number was given as an example; similarly, the example of the customer number located on a customer's catalog was not provided as a requirement for a customer number.

The second term, "distinct identification data element consisting of personal identification data," is not subject to the narrow construction proposed by defendants either. The word "distinct" indicates that this second form of identification must be different than the first form of identification for each caller. The claim language also requires that this second piece of information contain something "personal" by way of identification, that is, data that is assigned to a person or identifies a person as an individual as opposed to a customer of a merchant or vendor. Nothing in the claim language instructs that this second piece of identification cannot be a *personal* identification number (PIN) or an expiration data from a credit card as long as the data identifies the individual. The prosecution history cited by the defendants does not require that the Court adopt the defendants' construction either; Katz did not state in the Amendment that his system would not accept a PIN as a form of personal identification.

Thus, based on the claim language, the Court construes "caller customer number data" to mean: a number assigned to a customer by a vendor or merchant or recognized by a vendor or merchant for the purpose of identification of the customer. The Court construes "other distinct identification data element consisting of personal identification data" to mean: data that identifies a caller as an individual which is distinct from customer number data.

f. "Means for Selecting"

[29] The parties agree that the term "means for selecting" is subject to means-plus-function analysis. This term appears in Claim 104 of the '707 patent, in dependant Claim 103. The function, which is set out in the claim language itself and described in Column 10, lines 34 through 43 of the '707 patent, that is performed by the "means" is selecting a specific one of a plurality of formats based on the called number. In Column 4, lines 52 through 59, the specification of

the '707 patent discloses that the "interface 20 incorporates ... DNIS ... capability (call data analyzer 20a)." As explained in line 62 of the same column through line 2 of Column 5, "DNIS" is a function of the communication facility which provides data indicating the called number and may be used with the interface 20 and call data analyzer 20a.

The defendants contend that the Automatic Call Distributor AC1, the Interface 20, and the Switch 21 correspond to the "means" in "means for selecting." However, the specification at Column 6, lines 37 through 48 indicates that the ACD merely receives the call signal from the caller and "associates" the called number through the interface and the switch to the specific processor that contains the particular format associated with called number. Similarly, in Column 10, lines 31-43, the specification ***607** discloses that the communication facility couples the caller at the remote terminal to the correct processor to run the format selected by the called number through the ACD, the interface, and the switch. These passages do not specify which of these structures is performing the specific function of *selecting* the format based on the called number, as opposed to connecting the caller to the correct processor once the format has been selected.

The portion of the specification cited above from Columns 4 and 5 more clearly identifies that the interface and the CDA are the structures which perform the disclosed function. Thus, the Court concludes that the disclosed structure that corresponds to the "means" in "means for selection" is the Interface 20 and the Call Data Analyzer 20a in Figure 1. The ACD and the switch do not correspond to the means.

g. "Switching Structure"

[30] The term "switching structure" appears in Claims 49 and 50 of the '863 patent, and in context reads "switching structure coupled to said interface structure for switching certain select ones of said individual callers at said remote terminals to any one of a plurality of live operators wherein said live operators can enter at least a portion of said caller data relating to said select ones of said individual callers through interface terminals, which is stored in said record structure."

The plaintiffs contend that this term is not subject to means-plus- function analysis because the term "switch" is well known to those experienced in computer telephony and it brings to mind structure to those of skill in the art. The plaintiffs argue that switching structure should be defined as "hardware with associated software used to route calls." (Pls.' Appendix at 164).

The defendants contend that the term "switching structure" is subject to analysis under § 112, ¶ 6 because the term lacks a sufficiently definite structure such that one of skill in the art would not know what structure to build without more information than is provided in the claim. The defendants argue that in the passages that discuss the switching structure, including Column 5, lines 51-55; Column 7, lines 13-17; Column 10, lines 45-52; and Column 11, lines 8-12 of the '863 patent, Katz did not disclose structure to perform the entire function performed by the means, which is switching callers to a live operator, where the live operator enters caller data for storage in the record structure.

During the *Markman* hearing, all of the experts referred to "switches" in their discussion of computer telephony at the time of the Katz patents. Similarly, the term "switch" was often used in contemporary references and prior art referred to by the parties at the hearing. The Court concludes that, based on these examples of the state of the art and the testimony of the experts, the term "switching structure" does not implicate § 112, ¶ 6. The Court concludes that the term would have connoted a specific set of structures to those of ordinary skill in the art. Thus, based on the claim language and the specification, the Court construes the term "switching structure" to mean: a device including hardware and associated software that can switch or route telephone calls or signals from one location or connection to another.

h. "Record Testing Structure"

[31] The term "record testing structure" appears in Claim 192 of the '707 patent. The limitation in full provides for a "record testing structure connected to receive and test said caller data signals including said calling number identification data and said caller personal identification data against previously stored calling number identification and caller personal identification data."

The plaintiffs argue that this term is not subject to means-plus-function analysis because it would have called to mind sufficient structure to those of ordinary skill in the art. The plaintiffs propose that the Court construe "record testing structure" to mean "a hardware device, with associated***608** software, used to store information and implement tests based on that information." (Pls.' App. at 155).

The defendants argue that "record testing structure" is subject to § 112, ¶ 6. The structures the defendants contend corresponds to the function performed by the record testing structure are the Processing Unit 96, the Qualification Unit 93, the Buffer Storage 97, either the Look-up Table 99 or the Use Rate Calculator 100, and the logic within the qualification unit to receive information regarding the calling number from the interface. Further, the defendants argue that the structure corresponding to "record testing structure" cannot be any computer with any type of memory; if this were the case, the defendants argue, § 112, ¶ 6 would have no meaning. The defendants contend that the processing unit must be programmed to receive decoded personal identification data from the callers and to test it against stored data for the callers.

The Court concludes that "record testing structure" implicates § 112, ¶ 6 because "record testing" is clearly a functional term and it does not connote any structure for performing the function of receiving and testing said caller data signals including said calling number identification data and said caller personal identification data against previously stored calling number identification and caller personal identification data. The Court concludes that the structures disclosed in the specification that correspond to "record testing structure" are the Processing Unit 96, the Qualification Unit 93, and the Look-Up Table 99 in Figure 4. *See* Column 10, lines 1 through 25 of the '707 patent. Contrary to the defendants' contentions, the described functions of the Use Rate Calculator 100 and the Buffer Storage 97 in Column 10, lines 1 through 25 of the '707 patent are not required to perform the function of receiving and testing signals against stored data called out in the claim. Thus, these structures do not correspond to record testing structure.

3. "Processing"

[32] The next term the parties presented to the Court for construction from the Analysis Control System patents is "processing." In Claims 104 and 117 of the '707 patent, the term appears in context as "means for processing at least certain of said data developed by said terminals and said calling number identification data relating to certain select ones of said individual callers." In Claim 192 of the '707 patent, the terms appears in context as "analysis structure for receiving and processing said caller data signals under control of said record testing structure." The final analysis control system claim at issue in which "processing" appears reads "means for processing at least certain of said data developed by said remote terminals relating to certain select ones of said individual callers." Claim 171 of the '863 patent.

The parties agree and the Court concludes that the phrase "means for processing" is a means-plus-function limitation subject to § 112, ¶ 6. The structures corresponding to the "means" in "means for processing" include the Processing Unit 92 in Figure 4, the Central Processing Unit 251 in Figure 9, or the Processors PR1 through PRn in Figure 1.

The defendants argue that the term "analysis structure" in "analysis structure for ... processing" is also subject to means-plus-function analysis. To support their position, the defendants contend that in the '739 patent, which shares the same specification as the '707, '863, and the '309 patents, Katz used the term "analysis means" in limitations similar to the limitations which contain "analysis structure." The plaintiffs contend that "analysis structure" had meaning to those in the art and connoted computer hardware and software used to analyze data, such as a processor. (Pls' App at 160-61). The Court concludes that the term analysis structure is written in functional language and does not connote sufficient structure to avoid the application *609 of § 112, ¶ 6, despite the presumption to the contrary. The function of the analysis structure in the terms of the claim language is "receiving and processing said caller data signals under control of said record testing structure." The structures that correspond to "analysis structure" are the same as those that correspond to the "means" in "means for processing," i.e., the Processing Unit 92 in Figure 4, the Central Processing Unit 251 in Figure 9, or the Processors PR1 through PRn in Figure 1.

The core dispute between the plaintiffs and defendants is whether "processing," as used in "means for processing" or otherwise in the patents, requires a specific type of processing. The defendants contend, in the context of their means-plus-function arguments, that the structures that correspond to the "means" in "means for processing" also include the software that performs the function of processing, and because the only type of processing disclosed in the specification is statistical analysis to isolate a subset of callers in the context of the specific formats disclosed, the computer must be programmed with software that performs this particular kind of processing. Specifically, the defendants argue that all of the disclosed formats in the specification, including a health poll format, mail order format, instant lottery format, auction sale

format, television game show formats, and television poll format, require the use of statistical analysis to isolate a subset; thus, they argue, "processing" and "statistical analysis" are synonymous. The defendants also argue that if the term "processing" is given a broad, unlimited meaning, it would render other limitations that call out specific functions of a computer surplusage, such as "accessing" a file, "storing" data, and "testing" data.

The plaintiffs argue that the defendants' proposed construction of "processing" has no support in the claim language, and that the defendants are attempting to define the function of "processing" by importing structural limitations from the specifications. The plaintiffs argue that the term should be given its ordinary meaning, which is "performing some operation or sequence of operations on data and/or telephone calls." (Pls.' Appendix at 7).

The term "processing," even as part of the phrase "means for processing," is not subject to means-plus-function analysis, so an immediate resort to the specification for meaning is not appropriate unless there is some "hook" in the claim language on which limitations from the specification may be hung. *See* *Renishaw,* 158 F.3d at 1252. Thus, if the term "processing" in the context of the claim language had a common, ordinary meaning to those of ordinary skill in the art, that meaning is the proper construction of the term, even if it is broad. *See* *Johnson,* 175 F.3d 985, 989.

Contemporary technical dictionaries indicate to the Court that "processing" had a broad meaning to those of skill in the art for some time. In the context of these claims it is clearly implied that the processing is being performed on data. The *Standard Dictionary of Computers and Information Processing* by Martin H. Weik (1969) defines the verb "process" as follows: "In data processing, to handle, manipulate, or perform some operation or sequence of operations on data in accordance with a specified or implied algorithm, usually as a series of discrete steps, including operations such as compute, assemble, compile, interpret, generate, translate, store, retrieve, transfer, select, extract, shift, search, sort, merge, transliterate, read, write, print, erase, and punch. The processing usually results in a solution to a problem." (Ex. 458). In the *Computer Dictionary,* by Charles J. Sippl (1966), the term "process" is defined as a "generic term that may include compute, assemble, compile, interpret, generate, etc." (Ex. 498). In the *Dictionary of Computing and New Information Technology,* by A.J. Meadows et al. (1984), the term "data processing" is defined as including "all clerical, arithmetical and logical ***610** operations on data. Data processing in the context of information technology always implies the use of a computer for these operations." (Ex. 483).

The claim language also shows that the term "processing" does not by itself indicate statistical analysis to isolate a subset of callers. Many claims, dependent and independent, in the '707, '863, and '309 patents specifically call out processing to isolate a subset of callers. For example, Claim 169 of the '707 patent specifically calls out processing to isolate a subset of callers. Claim 174 of the '863 provides for "subsequent" processing that isolates a subset of callers; however, Claim 171, upon which Claim 174 depends, does not require such a parameter on the initial processing. Similarly, Claim 181 of the '863 provides for "processing ... responsive to said approval signals." Claim 185 of the '863 patent, which is dependant on Clam 181, specifically provides for processing to isolate a subset callers. The fact that "processing" is called out in some claims, and then specifically "processing to isolate a subset of callers" is called out in other claims, some of which are dependant on the claims that call out "processing" generally, indicates that the independent claims which contain the term "processing" do not necessarily require that the processing perform statistical analysis to isolate a subset of callers or data. *See* Rodime PLC v. Seagate Technology, Inc., 174 F.3d 1294, 1306 (Fed.Cir.1999). If the term "processing" were given the limited scope explicitly called out in the dependent claims, those claims would be rendered superfluous, a result that should be avoided if the claim language will allow under the doctrine of claim differentiation. *See* Laitram Corp. v. Rexnord, Inc., 939 F.2d 1533, 1538 (Fed.Cir.1991). [FN18]

FN18. The defendants contend that under *Laitram,* claim differentiation does not apply to means-plus-function limitations; however, the term "processing" is the functional language of the claim and is not subject to means-plus-function analysis.

There is nothing in the specifications that requires the Court to alter the broad meaning of "processing" conveyed in the claims, even though the subject of statistical analysis to isolate a subset of callers is repeatedly discussed. The name of the patents under consideration is "Telephonic- Interface Statistical Analysis System." At several points in the

specification, Katz describes his invention generally or one of the formats generally as performing statistical analysis to isolate a subset of callers. *See* Column 1, line 58-67 of the '707 patent (providing that "[i]n general, the present invention comprises a telephonic-interface system and related process ... in a variety of different interface formats or programs, as to ... statistically analyze acquired data, as in combination and is association with external data (time independent), and accordingly to isolate a subset of the callers with variable identification"); Column 2, line 22-26 of the '707 patent (providing that "in accordance with various formats, acquired data is processed in statistical relationship, or in relation to applied external data"); Column 5, lines 53-55 of the '707 patent (providing that "[i]n general, the processing evolves a subset (at least one caller) the members of which may be verified or confirmed"); Column 21, lines 33-38 (providing that "[i]n view of the above explanation of exemplary systems, it will be appreciated that other embodiments of the present invention may be employed in many applications to accumulate statistical data, process such data, and define subsets of callers of concern").

It is no surprise that Katz discussed statistical analysis to isolate a subset of callers in the specifications to the '707, '863, and '309 patents because he specifically called out this function in some, but not all, of the claims in those patents. Conversely, there is no mention in the specifications to the '285 and '150 patents of "statistical analysis" or "isolating a subset of callers" because none of the claims in those patents specifically call out such processing, even though the term "processing" *611 appears in the claims of those patents. While the specifications of the '707, '863, and '309 patents call out several embodiments of the Katz invention in which processing is performed to isolate a subset of callers through statistical analysis, not all of the claims that contain the broad term "processing" require this limitation. Whether, as defendants argue, Katz's claims are broader than his disclosure in the specifications of his patents, is a question for another day and does not alter the construction of "processing," a term that clearly had a broad and common meaning to those of ordinary skill in the art.

The portions of the prosecution history highlighted by the defendants do not conflict with the common understanding of "processing." During the prosecution of the '968 patent, from which the patents-in-suit descended, Katz distinguished his invention from a collection of prior art in part on the basis that his invention variously incorporated "(1) personal participant selectivity, (2) participant record development and (3) analytical inter- related data processing with respect to developed records." (Ex. 33, March 2, 1988 Amendment at 14). The defendants argue that this statement by Katz indicates that all of his claims, including pending Claim 37 which did not explicitly call out "statistical analysis to isolate a subset," incorporate statistical analysis or "inter-related processing." However, pending Claim 38, which was dependent on Claim 37, added the specific limitation of "processing said statistical data as to isolate a subset of said individual callers." Katz's assertions during the prosecution of the '968 patent that his invention *variously* incorporated three elements does not require, and this Court will not, import the limitation of "analytical inter-related data processing" or "statistical analysis to isolate a subset" into the definition of "processing" in claims of the '968 patent, or of any of the patents at issue in the *Markman* hearing.

During the prosecution of the '923 patent, which has the same specification as the '707, '863, and '309 patents, Katz attempted to distinguish his invention from a patent to Riskin by stating that the Riskin patent did not "suggest any interrelated processing between callers, nor are processing files formed other than merely to accommodate billing." (Ex. 38). In an Appeal Brief dated September 11, 1992 during the same prosecution, Katz described his invention as systems that "statistically acquire data, as in combination with and in association with external data (time independent), and accordingly isolate a subset of the callers with verifiable identification." (Ex. 38). Similarly, in the Information Disclosure Statement dated January 31, 1996 at 13 during the prosecution of the '185 patent, Katz informed the PTO that "[i]n various applications, Applicant's inventive systems have utilized an operation of processing data to isolate a subset of callers. In a refined form, the operation involves processing data from callers in combination to isolate a select subset of the callers by 'interrelated' processing." (Ex. 56). These statements by Katz indicated that his patents suggest or include interrelated processing or statistical analysis to isolate a subset of callers, which is clear by the claims which explicitly call out this function. However, none of these statements by Katz indicates that any particular claim includes this type of processing or that all processing suggested in his patent is of this type.

Based on the foregoing, the Court construes the term "processing" to mean: manipulation of data which performs some operation or sequence of operations on the data.

4. "Format"

[33] The next term presented to the Court for construction is "format." This term appears in many of the claims at issue in the *Markman* hearing. For example, Claim 104 of the '707 patent provides for "[a] system according to claim ***612** 103, wherein said called number identifies a specific one of a plurality of operating formats for interface." Claim 192 of the '707 patent provides for "[a]n analysis control system according to claim 191, wherein said select called number (DNIS) identifies a select format from a plurality of distinct operating formats."

The plaintiffs contend that the term "format" as used in the patents had a common meaning to those of ordinary skill in the art, and they ask the Court to define "format" as "a computer program, including instructions and/or pre- recorded messages, for providing a service to callers." (Pls.' Appendix at 7).

The defendants argue that although the term "format" only explicitly appears in some of the claims, the concept of "format" is implicit in all of the claims and corresponds to the "analysis control system" that is called out in the claims under consideration. Arguing that the term is imprecise and ambiguous without reference to the specifications, the defendants contend that "format" is defined by Katz in the specification as analysis that isolates a subset of callers and should be limited to include only the seven formats disclosed in the specifications, including mail order, auction, health poll, television game show, television game show requiring participation numbers, lottery, and television poll formats. Alternatively, the defendants argue that if the Court does not limit "format" to the seven disclosed embodiments, it should define "format" by common threads present in all the formats disclosed; for example, the defendants contend that a format must include a data acquisition phase in which callers enter or are assigned data for processing, and a processing phase in which that data for multiple callers is statistically analyzed with like data for other callers or with common external data to isolate a subset of callers participating in the format.

Construction begins with the claim language, and the language here is instructive. Considering Claim 192 of the '707 patent, which is quoted above, it is clear that "analysis control system" and "format" are not the same concept, as the claim includes both terms and indicates that the format is only a part of the analysis control system.

The language of other claims which were not designated for the *Markman* hearing supports a construction of format that does not require statistical analysis and is not limited to the seven disclosed embodiments of the specifications. In some claims, Katz specifically limited the format in a claim to a particular type of format. For example, Claim 42 of the '707 provides for a "promotional format," Claim 45 of the'863 patent provides for an "order format," Claim 46 of the '863 provides for a "television initiated mail order operation," and Claim 56 of the'863 provides for a "merchandising format." The fact that these particular formats are called out in some of the claims indicates that the term "format" alone is not limited to any particular format or set of formats.

The specifications of the patents do not indicate that "format" must include statistical analysis or be limited to the disclosed embodiments. Although the Background and Summary of the Invention in the specifications to the '707, '863, and '309 patents describes the invention as generally performing certain functions, including statistically analyzing data, it does not explicitly require that the "format" include statistical analysis or that the "format" is performing the statistical analysis. *See* Column 1, lines 43- 47, 57-67 of the '707 patent; Column 2, lines 4-14, 22-26 of the '707 patent. In addition, the language of the Background and Summary of the Invention is exemplary; it provides what the invention is *generally* or what it *may* include or perform. *See* Column 1, lines 43 through 67 of the '707 patent. Similarly, in describing the seven disclosed embodiments of his invention, Katz repeatedly stated that the examples were illustrative or exemplary. *See, e.g.,* Column 9, lines 48 through 51; Column ***613** 11, lines 66 through 67; Column 12, lines 1 through 19 of the '707 patent.

Figure 3 of the '707, '863, and '309 patents is a flow diagram for one operating format of the Katz system. *See* Column 2, lines 44-45 of the '707 patent. The diagram illustrates a series of commands or instructions for the computer and the sequencing of those commands, including the content and sequence of voice prompts and the operations on data to be stored in or retrieved from memory. There is no indication in the figure of statistical analysis or that the format is limited to the disclosed embodiments. To limit the term "format" in these patents to the disclosed embodiments would violate the ruling of *Comark Communications, Inc. v. Harris Corporation,* 156 F.3d 1182, 1187 (Fed.Cir.1998) and similar cases.

The prosecution history cited by the defendants does not support their proposed construction of "format." During the prosecution of the '023 patent, the examiner rejected certain of Katz's claims as anticipated by a patent to Riskin because the Riskin patent described various "formats," including stock quotation, movie directory, and product information services. (Ex. 48). Similarly, during the prosecution of the '120 patent, the examiner rejected certain of Katz's claims as being unpatentable over a group of references because the claims contained "game" or "operating process" formats that were selected through the use of the dialed number. These statements indicate that the examiner did not consider the Katz formats to be limited to the seven embodiments disclosed in the specifications because the examiner rejected some of Katz's claims as unpatentable over patents which contained "formats" other than the seven described by Katz. The defendants pointed to no statements by Katz during the prosecution of the patents in which he disclaimed coverage of any formats other than the formats discussed in the specifications.

Based on the foregoing, the Court construes the term "format" to mean: a computer program that sets forth the content and sequence of steps to gather information from and convey information to callers through pre-recorded voice prompts and messages.

5. "Multiple Formats" or "Plurality of Formats"

[34] The parties also disagree over the proper construction of the terms "plurality of formats" and "multiple format." [FN19] The plaintiffs argue that the terms "plurality" and "multiple" clearly had the common and plain meaning of "more than one" to one of ordinary skill in the art. The defendants do not contest that these terms mean "more than one," but rather they argue that because it is impossible to know whether a system is running on one format or more than one format, "multiple" or a "plurality of" formats must have three characteristics. First, each format must be a separate computer program and not just different questions or branching in the same format. Second, each format must have distinctly different subject matter and functionality. Third, each format must be reached by a different and unique called number.

FN19. These terms appear in the Conditional Format Claims at issue in the '150 and '285 patents and the Participation Number claims at issue in the '707 and '863 patents.

The plaintiffs agree that subroutines or branching within a format do not constitute multiple formats. The specification of the '707 patent confirms this. *See* Column 18, line 37 (noting in the context of the television game show format that "the basic format can remain the same, only the questions change by time zone"). The plaintiffs also agree that one phone number cannot be used to reach different formats. The specifications support this understanding of "multiple formats" or "plurality of formats." *See* Column 12, lines 5-6 (noting that one of the common structural elements of the Katz invention is "utilizing the called number to select a ***614** specific operating format"). However, the patents do not support the defendants' contention that each format of a plurality of formats or multiple formats must be assigned a unique called number.

The patents also do not support the defendants' contention that each format in a plurality of formats or in multiple formats must be different in the function it performs or in subject matter. In the '150 patent specification, Katz states that "[e]xemplary selected formats of the processor might include: public polls, lotteries, auctions, promotions, sales operations and games;" the use of plural to describe the formats indicates that the processor could run more than one of any type of format. Column 2, line 65 to Column 3, line 1 of the '150. Thus, if a processor is running a series of formats, even if all are lotteries or all are mail order formats, this would constitute a "plurality of formats" or "multiple formats."

The prosecution history cited by the defendants does not dictate that the Court should alter the construction of "multiple formats" or "plurality of formats" that is clear from the claim language and specifications. In an Amendment dated January 11, 1990 during the prosecution of the '506 application, Katz amended one of his claims to recite "a plurality of distinctly different operating process formats." (Ex. 36). However, the examiner subsequently rejected this claim as amended, and this particular language does not appear in any of the claims at issue. During the prosecution of the '150 patent, Katz noted in an Amendment dated October 5, 1989 that the patent to Riskin "contains no suggestion of a multiple format processor nor structure for conditioning accepted calls." [FN20] (Ex. 35). The Court concludes that Katz was not limiting the term "multiple format" to require formats with different subject matter or functionality in this statement to the PTO.

FN20. Katz made a similar statement in an Amendment dated June 30, 1992 during the prosecution of the '285 patent. (Ex. 50).

Based on the foregoing, the Court construes the terms "plurality of formats" and "multiple formats" to mean: more than one format. The terms do not include the subroutines or branching within a single format.

6. "Remote Terminals"

[35] The parties dispute the meaning of the term "remote terminals," which appears in claims throughout the body of patents to Katz. The parties agree that the term refers to traditional telephones, but the plaintiffs contend that the term may comprise other devices as well, such as wireless phones or a computer that can access the telephone network.

The plaintiffs contend that a person of ordinary skill in the art reading the Katz patents would understand that "remote terminals" could refer to devices other than traditional telephones. The defendants argue that there is no support in the specifications for any device other than traditional telephones.

The claim language in the patents does not support the defendants limited definition. Claim 96 of the '707 patent is exemplary of many of the claims that contain the term "remote terminals." Claim 96 provides for "[a]n analysis control system for use with a communication facility including remote terminals for individual callers, wherein each of said remote terminals may comprise a conventional telephone instrument including voice communication means and digital input means in the form of an array of alphanumeric buttons for providing data." The use of the words "*may* comprise" indicates that remote terminals includes, but is not limited to, traditional telephones.

The specification does not limit "remote terminals" to conventional telephones only. In Column 3, line 55 through Column 4, line 18 of the '707 patent, Katz describes ***615** the remote terminal illustrated in Figure 1. Although Katz describes what would be considered a traditional or conventional telephone, the specification is clear that the remote terminal in Figure 1 is the illustrative embodiment and that the description of it is exemplary.

The prosecution history cited by the defendants does not restrict the definition of "remote terminals." In the prosecution history of the '968 patent, in an Amendment dated March 2, 1988, Katz attempted to distinguish his patent from other patents containing, among other devices, "a special form of terminal apparatus at a data source" by noting that "[c]ontrary to the operations of the systems described in the above references, applicant's system interfaces with a *conventional telephone instrument.*" (Ex. 33). Katz went on further to explain regarding "special-purpose telephone instruments" that "[c]learly, such telephones could be employed in cooperation with applicant's system; however, a very significant feature of applicant's system is its ability to function cooperatively with a conventional telephone instrument. Accordingly, specific forms of transaction telephone instruments or data phones are not deemed to be particularly applicable to the claims as set forth herein...." Contrary to the defendants' contention, the Court concludes that this statement by Katz indicates that his system could accommodate conventional telephones, as well as other devices, not that it was limited to use with conventional telephones.

Thus, the Court concludes that there is nothing in the claim language, specifications, or prosecution history that indicates that "remote terminals" can only include conventional or traditional telephones and not wireless phones or computers connected to the telephone network. Based on the foregoing, the Court construes "remote terminals" to mean: a device or instrument for connecting callers to the telephone network for voice and digital communication, including, but not limited to, conventional telephones.

7. "DNIS" and "called number identification data"

[36] The next terms the Court must construe are "DNIS" and "called number identification data." These terms appear in many of the Analysis Control System claims, including Claim 104 of the '707 patent which reads "a system according to claim 96 for use with a communication facility having a capability (DNIS) to provide called number identification data to identify a called number from a plurality of different numbers for calling," [FN21] Claim 192 of the '707 patent which reads "an analysis control system according to claim 183, wherein said communication facility automatically provides called number identification data (DNIS) to identify a select called number from a plurality of called numbers," and Claim 65 of the '863 patent which reads "an interface structure ... including means to automatically receive call number identification

signals (DNIS) to identify a select format from a plurality of formats." [FN22]

FN21. This language is found in Claim 103 of the '707 patent, upon which Claim 104 depends.

FN22. The terms "DNIS" and "called number identification data" appear in claims other than the Analysis Control System claims; the parties agree and the Court concludes that the terms have a uniform meaning across all of the claims at issue.

The parties agree that the terms "DNIS" and "called number identification data" have the same meaning and are used interchangeably in the patents. The plaintiffs contend that the terms mean "a signal representative of the number called."

The defendants argue that DNIS or called number identification data must represent the full dialed number, which is seven or ten digits. The defendants also contend that DNIS or called number identification data cannot be internal routing *616 numbers or vector directory numbers; because the claims indicate that the communication facility provides DNIS or called number identification data *to* the interface and the interface *receives* DNIS or called number identification data *from* the communication facility, the defendants argue that DNIS or called number identification data cannot be any signal sent internally in the communication facility.

The Court concludes that the terms "DNIS," "called number identification data," and like terms have the same meaning and are used interchangeably in the patents. The term "DNIS" is an acronym for "dialed number identification service." Both "dialed number identification service" and "caller number identification data" contain the word "identification," and the plain import of these phrases is a signal or data that identifies the number that has been called. Thus, the language of the claims does not support the defendants' argument that "DNIS" or "called number identification data" must be the full seven or ten digit dialed number. The claim language does not support the defendants' argument that "DNIS" or "called number identification data" cannot include internal routing numbers within the telephone network; indeed, such numbers are neither mentioned in nor relevant to the Court's construction of the claims at all.

The passages of the specifications to which the defendants point do not support the limited construction proposed by the defendants either. In Column 12, lines 2 through 6 of the '707 patent, Katz describes one of the structural elements that have reoccurring significance in his inventions as "utilizing the called number to select a specific operating format." The defendants emphasize that Katz lists a ten or seven digit number as an example of the called number in the specifications; in Column 6, lines 41-45 of the '707 patent, Katz explains that "[r]eceiving the call signal, the automatic call distributor AC1 associates the called number ((213) 627-3333, rendered available using standard telephone DNIS techniques) through the interface 20 and the switch 21 to attain connection with the specific processor...." However, the mere reference to "called number" does not restrict "called number identification data" to a certain number of digits, nor is there reason to restrict the terms "DNIS" and "called number identification data" to the examples provided by Katz in the specifications.

Further, in Column 4, lines 62 through 64 of the '707 patent, Katz stated that "[g]enerally, DNIS capability is a function of the communication facility C (composite telephone system) to provide called terminal digital data indicating the called number." "Data indicating the called number" undermines the defendants contention that the data must be the full dialed number. Similarly, in Column 10, lines 39 through 42 of the '707 patent, Katz stated that "[n]ote that the communication facility C provides the dialed number ("(213) 627-4444") to the processing system P1 through well known telephonic equipment DNIS." These passages confirm that DNIS or called number identification data must only be a signal that identifies the called number and need not be only the seven or ten digit number.

The prosecution history cited by the defendants does not alter the meaning of the terms conveyed by the claim language and specifications. The first set of statements by Katz in the prosecution history, the defendants argue, indicates that DNIS or called number identification data must be the full dialed number. In an Information Disclosure Statement dated September 20, 1994 submitted during the prosecution of the '285 patent, Katz attempted to distinguish his claims from a group of patents and other references. (Ex. 50). Katz described the '012 patent to Matthews et al. as a "system identified as Direct Inward Dialing or 'DID,' which involves the capability of utilizing the last three or four digits of a

called number for routing to a desired recipient's telephone" and distinguished ***617** the system as "quite different from the combinations set forth in the claims in that, neither DNIS signals were utilized nor were formats selected. Additionally the system was void of either qualification or operator control...." [FN23]

FN23. Katz made an almost identical statement regarding the Matthews patent to the PTO in the prosecution of the '734 patent. (Ex. 61).

Similarly, in a Supplemental Amendment dated March 14, 1995 during the prosecution of the '734 application, Katz also distinguished the '906 patent to Matthews on the basis that the Matthews system "utilizes so called 'DID' signals for accessing an individual program.... However, again, the structure and operation is distinct from Applicant's techniques utilizing DNIS for format selection and further involving testing." (Ex. 61).

It is unclear from these two statements however, whether Katz was basing his distinction on the difference between the number of digits or content of a DID signal versus a DNIS or caller number identification data signal, or if he was basing his distinction on the different *functions* that those signals performed. What is clear is that Katz did not explicitly state that DNIS or called number identification must include all of the digits of the number dialed.

The second set of statements by Katz in the prosecution history, the defendants argue, indicate that DNIS or called number identification data cannot be internal routing numbers in the telephone network. In the September 20, 1994 Information Disclosure Statement, Katz described the '682 patent to Vij et al. as "another utilization of 'DID' operation to route calls. Again, the operation is quite distinct from DNIS operation and is further distinguished from the claims herein on the basis of testing, computer interface and so on." [FN24] (Ex. 50). In the same Information Disclosure Statement, Katz described the '500 patent to Binkerd et al. as "another alternative for routing calls utilizing inputs by a caller. Again the system is quite distinct from the utilization of DNIS capability." (Ex. 50). During the prosecution history of the '075 patent in the Preliminary Amendment dated July 17, 1990, Katz stated that "[r]ecognizing that the Riskin patent discloses the utilization of ANI and DNIS signals to accomplish telephone routing, it is respectfully submitted that applicant's system involves entirely different philosophical considerations and structure. The provision of an interface system utilizing these signals, not only to select an operating format but further to accomplish associative data, is submitted to involve a patentable distinction." (Ex. 40). In an Amendment dated August 31, 1995 during the prosecution of the '707 patent, Katz attempted to distinguish the '336 patent to DeBruyn for an international lottery system on the basis that the system indicated direction or routing to different processors for individual language operation in response to different dialed numbers, but "no suggestion of DNIS appears nor is the system otherwise pertinent." (Ex. 51).

FN24. Katz made an almost identical statement regarding the Vij patent to the PTO in the prosecution of the '734 patent. (Ex. 61).

These statements indicate that Katz distinguished his inventions from other patents on the basis of the comparative functions of the systems; the systems in the other patents use signals to route telephone calls, not select a format from a group of formats or to store data associated with those signals. However, Katz never informed the PTO that the same numbers that other systems used to route calls could not be used to identify the called number and select a format. In short, it is not clear from Katz's statements, contrary to the defendants' contention, that "internal routing numbers," to the extent they can identify the called number, could not be included in the meaning of called number identification data or DNIS, as used in the Katz patents.

***618** Based on the foregoing, the Court concludes that the terms "DNIS" and "called number identification data" are synonymous and mean: a signal or data that identifies the number called.

8. "ANI" and "Calling Number Identification Data"

[37] "ANI" and "calling number identification data" are the next terms presented to the Court for construction. In general, the term "calling number identification data" appears in the claims and the term "ANI" is used in the specifications. The parties agree that "ANI" and "calling number identification data" have the same meaning.

In the Analysis Control System Claims, the term "calling number identification data" appears in context as "receiving said calling number identification data." *See* Claims 33, 104, 117, and 192 of the '707 patent and Claim 171 of the '863 patent. In the Conditional Format claims, the terms appear in context as "call data signals as to indicate ... calling numbers" or "calling numbers as additional call data signals." *See* Claim 15 of the '150 patent and Claims 17 and 24 of the '285 patent. In the Products Carrying Participation Numbers Claims, the terms appear in context as "call data signals indicative of calling number identification data." *See* Claim 44 of the ' 707 patent and Claim 79 of the '863 patent. These terms appear throughout the Katz patents. The parties agree and the Court concludes that the terms have a consistent meaning across the claims at issue.

The arguments of the parties regarding the proper construction of these terms mostly mirror their arguments regarding "DNIS" and "called number identification data." The plaintiffs argue that these terms mean a signal provided by the telephone network that indicates all or part of the calling number. (Pls.' Appendix at 31, 69). The defendants argue that "ANI" and "calling number identification data" must refer to the entire calling number, do not include routing or billing signals used within the telephone network, and must identify the geographic location of the caller such that wireless phones are excluded. The arguments of the defendants will be addressed in turn.

There is no indication in the claim language that "ANI" or "calling number identification data" must be the full calling number; indeed many of the claims call out a signal that *indicates* the calling number. The specifications do not support the defendants' contention either. In Column 4, lines 62 through 67 of the '707 patent, Katz notes that "ANI capability is a similar function whereby the digital data indicates the calling number with calling terminal digital signals." The defendants contend that because Katz used ten digit phone numbers in his examples in the specifications, the terms "ANI" and "calling number identification data" must include the full seven or ten digit number. In Column 6, lines 62 through 65 of the '707 patent, Katz describes two ways in which the calling number could be transmitted to the Katz system; he notes that "the caller would push the buttons in sequence to indicate his telephone number, e.g. '(213) 627-2222.' Alternatively, the interface 20 can accept the calling number ((213) 627-2222) according to its provision by standard ANI equipment of the communication facility C." In Column 7, lines 29 through 30 of the '707 patent, Katz notes that "the first portion, section 53, contains a form of identification data, i.e., the caller's telephone number, i.e. '(213) 627-2222."

The first passage of the specifications cited by the defendants is provided as an example of a calling number. It is clear that the number from which a caller is calling would be a full seven or ten digit number; however, the specification is silent about what the *signal* that conveys this number, the ANI or the calling number identification data, would include. The second passage of the specifications cited by the defendants describes an example of ***619** data that is stored in a cell as represented in Figure 2, not "ANI" or "calling number identification data." Neither of these passages indicates that "ANI" or "calling number identification data" must include any particular number of digits.

As for the defendants' second argument, the claim language does not support a construction of "ANI" or "calling number identification data" that excludes routing signals or billing signals that are used within the telephone network. This argument is essentially the same as the defendants' argument that "communication facility" means that the Katz system must operate outside of the telephone network, which the Court addressed above and will not repeat here. In short, neither the claim language nor specifications mention routing or billing signals as either included or excluded in the definition of "ANI" or "calling number identification data." Determining whether routing or billing signals are signals which indicate the calling number is not a matter of claim construction, and as such, is not properly before the Court.

Further, the prosecution history cited by the defendants neither confirms their proposed construction of "ANI" or "calling number identification data" nor conflicts with the plain meaning of the terms "ANI" and "calling number identification data" conveyed by the claim language and specifications. In an Amendment dated April 15, 1996 in the prosecution of the '751 patent, Katz attempted to distinguish the '020 patent to Fodale to support his amendment. Katz described the Fodale patent as providing a system which blocks delinquent telephone terminals from making toll calls by comparing routing and billing information provided by the local telephone office against a list of delinquent terminal numbers. Katz notes that in one arrangement in the Fodale patent, ANI provides the calling or billed number. Katz stated that "[n]o reference to ANI can be located in providing the

caller number, which presumably is otherwise available to the local toll network." (Ex. 67). The defendants contend that Katz was referring to "his" version of ANI in this last statement and distinguishing signals that are sent outside the telephone network from the billing signals or routing signals that are internal to the telephone network. The defendants' interpretation of this statement by Katz is inconsistent with his statement that Fodale uses ANI to provide the calling or billed number in one arrangement. While the meaning of Katz's statements in this Amendment is not completely clear, the Court concludes that these statements clearly do not convey the message that the defendants would attribute to them, that Katz was disclaiming coverage of routing and billing signals.

As for the defendants' final argument, there is no requirement in the claim language that "ANI" and "calling number identification data" must identify the geographic location of callers. The defendants argue that the "ANI" and "calling number identification data" must disclose the geographic location of the caller because the formats disclosed in the specifications use ANI to screen callers based on their geographic area. In his description of a television game show format in Column 18, lines 37 through 44, lines 56 through 62 of the '707 patent, Katz proposes that different questions be used for different geographic locations to accommodate the different time zones and that "area code numbers afford an effective geographic classification of callers." In the context of the discussion of a television poll format in Column 20, line 16 through 22 of the '707, Katz proposes that callers may be screened by geographic area according to their telephone number which is provided by ANI equipment. The defendants contend that because Katz uses the geographic location of the callers taken from the calling number in these formats, the Mobile Identification Number or MIN supplied by wireless phones cannot constitute "calling number identification data" or "ANI" because MIN does not supply an ***620** accurate indication of the callers geographic location. However, in the discussion of an instant lottery format in Column 12, lines 46 through 47 of the '707 patent, Katz proposes the use of a caller's telephone number and date of birth to qualify a caller based on his age; in this example, the calling number is not used to qualify a caller based on his geographic location. Similarly, Claims 165 and 175 of the '707 patent call out the use of calling numbers for purposes other than determining geographic limitations. To adopt the defendants' construction of the terms at issue to always require the identification of the geographic location of the caller would not only improperly limit the claims by the examples disclosed in the specifications, but also would limit the claims in a manner inconsistent with some of the other examples in the specifications. The Court concludes that there is no basis in the claim language for importing such a limitation.

Based on the foregoing, the Court concludes that "ANI" and "calling number identification data" are synonymous in the claims at issue in the Katz patents and mean: a signal that identifies the calling number, i.e. the number from which a call originated.

9. In-band or Out-of-band Signaling

[38] The defendants have requested that the Court determine whether the patents require the signals indicating the called and calling number as just discussed to be transmitted "in-band," or along a voice channel in the form of analog signals, and not "out-of-band" via an Integrated Services Digital Network (ISDN) connection. The plaintiffs contend that the patents are silent on whether the signals must be transmitted, or in-band or out-of-band, and thus no particular manner of connection or mode of transmission of these signals is required.

The parties presented expert testimony and argument on the difference between in-band and out-of-band signaling. In short, a signal carrying data may be transmitted over a telephone connection that travels in the same channel or line as the voice signal travels; such a data signal is said to be traveling "in-band." Traditional telephone connections are set up in this manner. A signal carrying data may be transmitted over a telephone connection in a channel or line that is separate from the channel or line that the voice signal travels; such a data signal is said to be traveling "out-of-band." An ISDN connection, which provides two voice channels and one data channel in the same connection, is an example of "out-of-band" signaling. A T1 connection provides for 24 channels or lines in the same connection; a data signal may travel in-band with each of the 24 voice channels or out-of-band in one of the channels along with the other 23 voice channels. (*See* Defendants' Demonstrative Exhibit 36).

To support their argument that the patents require in-band signaling, the defendants contend that the limitation in Claim 96 of the '707 patent which reads "means to provide signals representative of data developed by said remote terminals and for receiving said calling number identification data" is a means-plus-function limitation, and therefore, the Court must determine the structure disclosed in the

specification that corresponds to the "means." [FN25] The defendants contend that the only structure disclosed in the specifications is an in-band connection. For support for this argument, the defendants rely heavily on Figure 1 in the '707, '863, and '309 patents. Figure 1 illustrates one hundred calls or lines coming into the Automatic *621 Call Distributor AC1, fifty lines coming from the ACD to the Interface 20, and fifty lines coming out of the Interface 20. *See also* Column 4, lines 24 through 27 and Column 5, lines 3 through 13 of the '707 patent. The defendants contend that if Katz contemplated that the call data signals would be sent out-of-band, he would have had to show 51 lines going into and coming out of the Interface to allow for the separate data line in an ISDN connection. The defendants contend that Katz's disclosure of in-band signaling in Figure 1 is the structure to which the "means" corresponds. However, Figure 1 is an illustration of how the Katz system may be set up. Even assuming that the defendants' contention regarding the figure is correct, the Court concludes that Figure 1 does not require that the signals be sent in- band; it only illustrates that the signals *may* be sent in-band.

FN25. The defendants also contend that ANI or calling number identification data, and DNIS, or called number identification data signals, even in claims which are not in means-plus-function form, refers to in-band signaling only. However, to support this position, the defendants point to the same claim language and passages of the specification that they rely on to support their means-plus-function argument. Thus, the Court will treat these two issues together.

In addition, the defendants point to Column 4, lines 52 through 58 of the '707 patent, which indicates that the interface for receiving ANI may be a Centrum 9000 or an interface which includes tone decoders. The defendants contend that such interfaces could only receive analog in-band signals, not digital or ISDN signals. However, even assuming that this representation about the capacity of these interfaces is true, the types of interfaces provided in the specifications are exemplary only; they do not indicate that the signals can *only* be sent via one of these interfaces or that the signals can *only* be sent in-band.

In Column 4, lines 52 through 58 of the '707 patent, Katz notes that "the interface 20 incorporates modems, tone decoders, switching mechanisms, DNIS and ANI capability (call data analyzer 20a) along with voice interface capability." It is clear that the tone decoders and the DNIS and ANI capability of the call data analyzer perform the function of providing and receiving signals from the remote terminals and the communication facility. Thus, the Court concludes that the structures that correspond to the "means" are the Interface 20 and the Call Data Analyzer 20a.

The plaintiffs note that Claim 15 of the '150 patent, a process claim, recites the limitation of "receiving said call data signals from said telephonic communication system for a calling remote terminal," which is not written in means-plus-function form. They argue that the language of this claim in no way indicates the type of line on which the call data signals must be received and because it is not a means-plus-function limitation, it is not appropriate to import structure from the specifications. The Court agrees. In the specification of the '150 patent, in Column 4, lines 12-17, Katz discusses the call data referred to in his claims. The only requirement of the call data signals set forth in the specification pertains to the content of the signal: it must convey the called and calling number. There is no requirement in the specifications that the signals be sent in a certain manner or over a certain type of line or connection.

The patents are silent as to whether the call data signals must be transmitted "in-band" or "out-of-band." Thus, the Court concludes that the claims at issue do not require or exclude any particular manner of transmission or type of signaling.

10. "Consumable Participation Key" and "Limits on Use"

[39][40] The parties have presented the terms "consumable participation key" and "limits on use" to the Court for construction. "Consumable participation key" appears in Claim 51 of the '309 patent and reads in context "qualification structure controlled by said record structure for testing caller data signals provided by a respective one of said individual callers to specify a consumable participation key for restricting the extent of access to said system to limit data stored from said respective one of said individual callers on the basis of entitlement." The term also appears in Claim 65 of the '863 patent and *622 reads in context "qualification structure for testing caller data signals provided by at least one of said individual callers to specify a consumable participation key, said consumable participation key for use during a single

predetermined period of time for restricting the extent of access to at least a portion of said system by said one of said individual callers on the basis of entitlement."

The term "limit on use" or "limits on use" appears in Claims 33, 44, and 93 of the '707 patent and Claims 79 and 190 of the '863 patent. Claim 33 of the '707 patent recites in part a "qualification structure controlled by said record structure for testing said calling number identification data to specify a basis for entitlement defining a limit on use, for restricting the extent of access to said system for a respective one of said certain of said individual callers.... An analysis control system according to claim 26, wherein said limit on use relates to a dollar amount." The other claims in which "limits on use" appears are substantively the same; Claim 44 of the '707 is representative and reads "providing products carrying participation numbers specifying limits on use to entitle individual callers to access said operations of the interface with said telephonic communication system."

The parties agree that "consumable participation key" should be defined as a number or word that allows a caller access to a service or part of a service a predefined limited number of times and which cannot be refreshed or recharged. While the ordinary meaning of the claim language gives some indication of the meaning of "consumable participation key," the specification makes it clear. In Column 9, lines 31 through 35 of the '707 patent, the specification provides that "[f]or example, a list may be preserved by a use- rate calculator to implement a consumable key operation. That is, a user is qualified to a specific limited number of uses during a defined interval."

The parties disagree, however, on the meaning of "limits on use." The plaintiffs argue that "limit on use" means "a control imposed on the degree or extent to which callers may avail or utilize a service or one or more operations of a service." (Pls.' App. at 74). The plaintiffs contend that a limit on use can be any one of a range of restrictions including "limits based on the total number of permitted accesses, the time of day for permitted accesses, limits on use based on a dollar value, [and] limits on use based on a predetermined period of time." (Pls.' App. 75-76). The defendants argue that this term has the same meaning as consumable participation key in that it is a control on the number of times a caller may enter a format in the Katz system. The defendants agree that a limit on use can be fixed by a set number of uses or a set dollar amount. However, the defendants argue that a limit on use does not perform a metering function in that it does not effect the duration of access to a format; consequently, it cannot disconnect a caller during a format for exceeding a set period of use.

The place to begin is the claim language. Claim 33 of the '707 patent provides for a limit on use that relates to a dollar amount. The plaintiffs argue that this Claim clearly shows that limit on use is not restricted to only the number of calls or accesses into the system. Although this claim does not explicitly recite that the limit on use would be a duration of time linked to the set dollar amount, e.g. $10.00 limit at $2.00 per minute, it does not explicitly recite that the dollar amount could only be linked to a set number of accesses, e.g. $10.00 limit at $2.00 per access.

The defendants argue that the limits on use are used to qualify callers for access to the operations of the interface, which necessarily has to occur before the caller enters into the Katz system. However, claim 44 of the '707 patent provides for a further step of "invalidating on-line said participation numbers after said limits on use specified by said participation numbers are ***623** reached." This claim calls out a step of utilizing the limit on use at a later point in the process after the qualification step.

The specification confirms that "limit on use" should not be restricted to set number of accesses to the Katz system. In Column 12, lines 52-57 of the '707 patent, Katz describes how a calling number may be "checked by the use- rate calculator to determine the number of times it has been used in excess of a predetermined number of calls *or dollar value* to participate in the lottery during a current interval of monitoring." (emphasis added). Similarly, in Column 12, lines 22 through 26 of the '707 patent, Katz describes how a lottery format may use a limit on use and states that "[f]or example, a person might be entitled to play the lottery a limited number of times or *to the extent of a limited dollar value* during a predetermined interval." (emphasis added).

Contrary to the defendants' assertion, the Court concludes that Katz does not equate all limits on use to consumable participation keys. In Column 9, lines 32 through 35 of the '707 patent, the specification provides that "a list may be preserved by a use-rate calculator to implement a consumable key operation. That is, a user is qualified to a specific limited number of uses during a defined interval." The use of the phrase "limited number of uses," which accurately describes a consumable

participation key, does not indicate that all "limits on use" are consumable participation keys. Thus, it is clear from the claims and specifications that a consumable participation key is only one kind of a limit on use.

There is no indication in the Katz patents of a method of measuring a limit on use based on a dollar value. That is, neither the claims nor the specifications require that the limit on use based on a dollar value be decremented by the number of accesses to the system, ie. $2.00 for each access. The claims and the specifications leave open the possibility that the dollar amount could be decremented by some other method of measurement, such as time spent in the Katz system; ie. $2.00 for 10 minutes, such that the limit on use served a metering function.

The statements made by Katz in the prosecution history cited by the defendants do not require a different construction than what is clear from the plain language of the claims and specifications. During the prosecution history of the '707 patent, certain of Katz's pending claims, including pending claim 47, were rejected by the examiner in an office action as unpatentable over two patents and an article of Turbat. (Ex. 51). In an Amendment dated August 31, 1995, Katz amended pending claim 47 by substituting the phrase "one time use" with "limit on use." Katz also argued against the examiner's rejection of his pending claim 47 in a section entitled "Discussion of the Rejections of Claims 32, 37, 40, 41 and 47 under 35 U.S.C. § 103." In that section, Katz distinguishes the rejected claim 47 on the basis that "[a]pplicant's system, as claimed, is independent of both *time* (Barger and DeBruyn) and *value* (Turbat)." However, this discussion was clearly directed toward the rejection of the claim as originally written, which called for "a basis of entitlement defining a one time use," as evidenced by Katz's statement at the end of the discussion section that "[t]he rejected claims are urged to be distinct for the reasons presented above." Based on this review of the prosecution history, the Court concludes that Katz's statements about a claim that read "one time use" do not limit the claims that were eventually accepted, which read "limit on use."

Based on the foregoing the Court concludes that "consumable participation key" means: a number or word that allows a caller access to a service or part of a service a predefined limited number of times and which cannot be refreshed or recharged. The Court concludes that "limit on use" means: a control that limits a caller's access to a service based on some predetermined method of measuring the ***624** level of use. The term "limit on use" is not restricted to a specific method of measuring use, such as a limited number of accesses into the Katz system.

B. CLAIMS INVOLVING PRODUCTS CARRYING PARTICIPATION NUMBERS

Claims Involving Products Carrying Participation Numbers are Claims 44 and 93 of the '707 patent and Claims 79 and 190 of the '863 patent. The text of these claims is set forth in the Appendix.

In general, these claims involve a method for limiting a caller's entitlement to access the functions of the system by requiring the caller to enter a participation number. These participation numbers are carried on products that are in some way provided to the caller prior to the call. The participation number corresponds to data stored in memory in the system which specifies a limit on a caller's access to the system.

1. "Products Carrying Participation Numbers"

[41] The plaintiffs contend that the term "products carrying participation numbers" is straightforward and its meaning may be taken from the ordinary meaning of the words themselves. The defendants argue that the words "product" and "carrying" indicate that the product on which the participation number is carried must have inherent value apart from the number; thus, the defendants argue, "products" cannot include prepaid calling cards.

The term "products" is not used in the Katz patents as a term of art, as the parties agree. Thus, the Court should give the term its plain, ordinary English meaning. The Court concludes that the plain meaning of "products," which denotes an item produced for use in a commercial setting, does not support the construction given to it by the defendants. The plain meaning of the term "product" in the claim language does not connote something of inherent value apart from the number carried with it.

The specification does not contradict the plain meaning of "products." The only place in the specification that discusses products carrying participation numbers is Column 17, lines 13 through 17 of the '707 patent, which reads "[a] key to participation in the game show may involve the purchase of a particular product. For example, a person desiring to participate may purchase a product which carries a concealed key number. The number serves as a caller's key to participation in the game

show." This passage in no way suggests that the product must have value independent of the participation number. The defendants also point to Column 9, lines 35 through 38 of the '707 patent, which discusses restricting callers to the purchasers of a medical apparatus. This discussion is given by way of example only and does not indicate that all "products" must have inherent value apart from the participation numbers.

The defendants rely on statements made by Katz during the prosecution of the '707 patent. In the August 31, 1995 Amendment, Katz distinguished the '275 patent to Kamil by stating that "Kamil discloses a telephone system enabling prepayment for telephone calls, wherein special code and credit information is stored in memory in special exchanges and debited as the call progresses" and that Kamil "does not disclose specific limitation recitations including consumable key operation, nor does it disclose providing a product bearing a participation number specifying a limit on use." (Ex. 51). The defendants argue that Katz clearly stated that his invention was distinct from Kamil because Kamil used prepaid tickets which do not have inherent value, and thus, are not "products."

The Court concludes that Katz did not unambiguously state that his invention required products with inherent value apart from the participation number; it is possible, ***625** for example, that Katz's distinction was based on the fact that Kamil's special code connected with the prepayment for telephone calls did not specify a limit on use. Katz did not mention Kamil's use of a prepaid ticket as a method of recording the prepayment in his statements so it is not clear that Katz was using the concept of a prepaid ticket as the basis for his distinction. In addition, these statements were made by Katz in a voluntary amendment, not in an effort to change the examiner's decision on a rejected claim. Thus, the Court concludes that Katz's statements do not indicate a clear disavowal of coverage so as to require that "products" have inherent value apart from the participation numbers. *See York Products,* 99 F.3d at 1575.

Based on the foregoing, the Court concludes that "products carrying participation numbers" means: a physical item sold or exchanged in a commercial setting which carries a number allowing participation in the Katz system.

2. "Accounting data"

[42] The second term from the Claims Involving Products Carrying Participation Numbers that the parties have presented to the Court for construction is "accounting data." This term appears in Claim 44 of the '707 patent, which includes the step of "providing on-going accounting data to said individual callers at intervals during calls from said individual callers."

The plaintiffs argue that "accounting data" should be construed according to its ordinary, common meaning, which is information relating to a reckoning or a computation. (Pls.' App. 83-84). The defendants argue that "accounting data" means callers' scores in the television game show format because that is the only format in the specifications in which Katz discusses accounting data.

The claim language does not support the construction proposed by the defendants. Nothing in Claim 44 indicates that "accounting data" should be limited to only callers' scores in a television game show format. In addition, Claim 45 of the '707, which is dependant on claim 44, provides for the step of "accounting for said limits on use for said participation numbers for said individual callers by incrementing or decrementing on-line said cumulative use for said individual callers to said limits on use." In this claim, the concept of accounting connotes keeping a record of the usage of the Katz system according to set limits on use associated with a caller's participation number; the language of this claim in no way limits the concept of accounting to scores in a game show.

The defendants contend that Column 16, lines 44-53 of the '707 patent is the only place that Katz describes "accounting data." In that passage of the specification, Katz discusses a television game show format and states that:

> The participant data is stored in an assigned cell of the memory 98 (FIG.4) for the caller and as the game proceeds, the processing unit 92 tallies the caller's score. Scores are interrelated between individual processing units to actuate the terminal CT. Thus, individual accounting occurs for each of the calling participants on an on-line basis dependant upon the success of the studio players and their association with the callers. On-going accounting data may be provided at intervals or real time by the recorded voice to each contestant.

However, in Column 17, lines 44 through 48 of the '707 patent, the specifications reads "the table 99 may be a large, shared unit that tabulates each of the key numbers and accounts for their use. If the caller has identified a proper key number, the process proceeds and the key number is accounted, i.e. incremented or

decremented to the limit of use if any." Contrary to the defendants assertion, Katz discusses accounting in this passage of the specification in a context other than a television game show format. This passage of the specification is consistent with the language *626 of Claim 45, which adds the step of "accounting for said limits on use for said participation numbers," and indicates that "accounting data" may relate to the limits on use specified in the participation numbers or consumable key numbers, and not only callers' scores in a game show. Further, even if the only example of "accounting data" in the specification were in the television game show context, the Court finds no reason in the claim language to restrict the term to a disclosed embodiment in the specification. *See* Johnson Worldwide, 175 F.3d 985, 989.

The defendants argue that the prosecution history of the '707 patent supports their construction of "accounting data." In a Supplemental Amendment dated December 28, 1994 during the prosecution of the '707 patent, Katz added Claim 53, which eventually became Claim 37 (upon which Claim 44 depends). In his remarks, Katz stated that "[s]upport for the 'accounting' distinction may be found, for example, at page 34, lines 11-21 of the present specification," which corresponds to the passage in the specifications upon which the defendants rely. The Court concludes that this statement by Katz in no way limits the term "accounting data" to only callers' scores during a television game show format, as evidenced by his use of the phrase "for example."

The claim language and the specification makes it clear that a caller's score in a television game show format is accounting data, but it only one example of accounting data, not the term's definition. Based on the foregoing, the Court construes the term "accounting data" in accordance with its ordinary, common meaning to mean: information relating to a computation of data.

3. "Operations of the Interface"

[43] The third term from the Claims Involving Products Carrying Participation Numbers the parties have presented to the Court for construction is "operations of the interface." This term appears in the preamble of Claims 44 and 93 of the '707 patent and Claims 79 and 190 of the '863. The language containing this term varies slightly in the claims, but generally provides for "[a] process for controlling operations of an interface with a telephonic communication system." The term "operations of the interface" as it appears in the preamble is also referred to in the limitations of the claims, such as "to access said operations of the interface."

The defendants argue that "operations of the interface" is synonymous with "format." The plaintiffs contend that the term should be construed as "the set of processes or actions that effectuates interactive connection and that is part of the work performed by the system connected to the telephone network." (Pls.' App. at 68).

The claim language does not support the defendants' limited construction of this term. In the second limitation of Claim 37, upon which Claim 44 depends, the claim includes the step of "receiving said call data signals ... to select a specific operating format from a plurality of operating formats of said operations of the interface." This claim recites both the terms "format" and "operations of the interface." The use of both terms separately in the same claim indicates that they have different meanings. In addition, the claim refers to selecting one of a plurality of operating formats of the operations of the interface, which shows that the operations of the interface includes more than one format. Further, the term "format" is not present in Claims 93 of the '707 patent or Claim 190 of the '863 patent, which indicates that the operations of the interface do not necessarily include a format.

The term "operations of an interface" is not discussed in the specification. The defendants point out that in Column 10, lines 32, 39, and 43, Katz refers interchangeably to "mail order operating format" and "mail order interface." From this portion of the specification, however, the Court cannot conclude that the operations *627 of the interface can *only* include a format.

The Court concludes that there is no reason in the claim language or specifications to depart from the ordinary, common meaning of "operations of the interface." Based on the foregoing and consistent with the Court's construction of "interface structure," the Court concludes that the term "operations of an interface" means: the processes, activities, or functions of the interactive connection between the processors upon which the Katz system is running, the communication facility, and the callers. The term does not require that the Katz system be running a format, or specifically, one of the seven formats disclosed in the specifications.

4. "Answer Data"

[44] "Answer data" is the fourth term the parties have presented to the Court for construction from the

Claims Involving Products Carrying Participation Numbers. The term appears in Claims 44 and 96 of the '707 patent and Claims 79 and 190 of the '863 patent. The language of the limitations in which "answer data" appears is almost identical in each patent and reads "receiving digital identification data from said individual callers responsive to said voice signals including said participation numbers for said individual callers and answer data developed by said remote terminals under control of said individual callers."

The parties agree that the clear meaning of "answer data" is responses by callers to vocal questions or prompts. The defendants ask this Court to exclude any response that includes a telephone number, and specifically the telephone number of the party the caller would like to reach, from the definition of "answer data."

The defendants argue that the specifications describe callers providing answers to questions only in the context of one of the Katz formats, and because making a telephone call is not a format, a telephone number cannot be included in the definition of "answer data." *See* Column 7, lines 46 and 59; Column 17, line 8; Column 19, line 17 of the '707 patent. Even taking the defendants characterization of these passages of the specification as true, the Court has already rejected the defendants' narrow definition of the term "format" in the context of these patents. Further, there is nothing in the passages of the specifications cited by the defendants that indicates that answer data could not include any telephone number, including the number the caller is trying to reach.

The Court concludes that there is nothing in the claim language or specification that restricts the ordinary, common meaning of the term "answer data," which denotes data containing answers or responses. The defendants argue that "answer data" cannot encompass all answers to questions because the claims refer to some types of answers with specific terms, such as participation numbers. Although the claims recite different terms to refer to some specific responses received from the callers, the use of these more specific terms does not indicate that the broad term "answer data" cannot encompass these responses as well.

The prosecution history cited by the defendants does not support their construction of "answer data" nor does it limit the ordinary, plain meaning of the term as expressed in the claims. The defendants argue that Katz distinguished his inventions from a patent to Newkirk, which involved a system that enabled callers to make calls at pay telephones using a magnetic stripe on a card. In the prosecution history of the '968 patent in a Supplemental Amendment dated May 4, 1988, Katz stated that:

> The Newkirk et al. patent (4,439,636) is directed to a system for enabling a magnetic stripe card to be used at a pay telephone somewhat independently of the composite telephone system. Although the Newkirk patent discloses digital communication between a remote ***628** terminal and central terminal, the communication essentially involves the magstripe of a credit card. Distinct from applicant's development, Newkirk does not contemplate any operations related to statistical analysis. Specifically, with respect to the claims herein, while the Newkirk patent utilizes a calendar clock and form records for purposes of billing, the system does not store any form of "answer data."

(Ex. 33). The defendants contend that Katz's statements indicate that a telephone number could not be answer data. The Court concludes that Katz's statement that the Newkirk system did not store any form of answer data does not limit the term "answer data" to exclude responses that include telephone numbers. Katz stated that the only communication between a remote terminal and a central terminal was through the magnetic stripe; such a magnetic stripe would not have constituted "answer data" as this Court concludes that term is used in the Katz patents.

Although not addressed by Katz in his statements regarding Newkirk, the defendants argue that the Newkirk patent provided for callers to be "prompted" by a dial tone to enter the telephone number they were trying to reach. Thus, the defendants argue, Newkirk involved callers' responses to prompts and Katz statement that Newkirk did not include answer data indicates that Katz was disclaiming responses involving telephone numbers from the scope of the term. The Court is not persuaded by this argument for two reasons. First, Katz did not mention that Newkirk prompted callers with a dial tone in his discussion of the Newkirk patent; thus, the Court will not limit Katz's claims by a statement that he did *not* make during the prosecution of the patents. Second, the patents make clear that the questions or prompt must be vocal or voice generated. [FN26] Thus, the dial tone used in Newkirk is not a "prompt" or "cue" as used in the Katz patents.

FN26. Claim 44 provides support for the notion that the questions or prompts are vocal in nature. The third limitation in Claim 37, upon which Claim 44 depends,

> provides for "coupling said remote terminals to said interface for providing voice signals to said individual callers and generating said voice signals for actuating said remote terminals as to provide vocal operating instructions to specific ones of said individual callers." The specification also supports the idea that answer data is responses to vocal questions or prompts. *See* Column 7, lines 46 through 53 of the '707 patent.

During the prosecution of the '846 application, Katz distinguished his patent from a patent to DeBruyn. (Ex. 66). In an Amendment dated July 7,1997, Katz stated:

> DeBruyn is silent as to the fourth and fifth steps of claim 31. These steps provide: "cueing callers with selected questions from a batch of questions;" and "receiving answer data ... responsive to the selected questions." DeBruyn prompts callers for simple and fixed input: a phone number and a Lotto number, which can be confirmed and corrected in linear fashion. There is no suggestion or disclosure of selected "questions from a batch of questions." DeBruyn does not contemplate a selection of the same or different questions for different callers, from a batch of questions. DeBruyn, by its silence, can not imply cueing callers with those questions, nor receiving answer data in response to those questions.

It is clear that in these statements, Katz was distinguishing his patent from DeBruyn on the basis that DeBruyn did not select questions from a batch of questions or receive answers to those questions from a batch of questions. These statements clearly do not indicate that answer data cannot include any telephone number, including the number the caller is trying to reach.

Based on the foregoing, the Court concludes the term "answer data" to mean: responses from callers to vocal questions or prompts.

*629 C. CONDITIONAL FORMAT CLAIMS

The Conditional Format Claims include Claim 15 of the '150 patent and Claims 17, 20, 24, and 77 of the '285 patent. In general, the '150 and '285 patents describe a system and a method for interfacing callers with a processing system which can handle multiple callers and run multiple formats. The '285 patent also includes the option of interfacing callers with a live operator who receives prompts from the processing system. Certain of the formats of the processing system may contain conditions which restrict access to their use by callers; these conditions are stored in memory in the processing system in connection with the corresponding format. Call data, including the called number, the calling number, and the equipment signals, is used by the processing system to select the format the caller wishes to access and to restrict access to formats according to any associated conditions.

Claim 15 of the '150 patent and Claim 17, 20, and 24 of the '285 patent are method claims; Claim 77 of the '285 patent is an apparatus claim. The method claims are very similar and all contain at least four basic steps, including receiving call data signals, selecting a format under control of the call data signals, testing the selected format in relation to the call data signals, and conditionally interfacing said selected format with the calling terminal. The text of these claims is set forth in the Appendix.

The parties' arguments regarding the proper construction of the testing step and the sequence in which the four basic steps in the method claims must be performed are intertwined. The plaintiffs argue that the "testing the selected format step" includes the test referred to in the specification as the "validity bit check," which tests the ANI of the caller against a negative list of "bad" ANIs stored in memory. Under this construction, because the validity bit check may be performed before the selecting step, the testing step could be performed before the format is chosen in the selecting step. The defendants argue that the validity bit check is not encompassed by the testing step, but rather is separately called out in Claim 24 of the '285 patent; thus, as is clear from the claim language, the steps must be performed in the sequence in which they are listed in the claims. The proper construction of the testing step will be addressed first.

1. "Testing the Selected Format"

[45] The first term the parties presented to the Court for construction from the Conditional Format Claims is "testing the selected format." This term appears in all four of the method claims, and reads in context "testing the selected format in relation to said call data signals." Although the claim language is unclear as to whether the test is performed *on* the format or *for* the format, the parties agree that "testing the selected format" means the step of performing a test based on conditions associated with a format before a caller is allowed to interact with a format.

The disagreement surrounds the scope of the testing step. In addition to the argument over whether the validity bit check is encompassed by the testing step, the parties disagree over whether the test must include the use of a control word or control data and whether the test that is performed must be specific to each format or if formats may be conditioned as a group. The defendants contend that the step of "testing" must involve the use of, or "fetching" of, a "control word" to identify the conditions associated with the selected format. The plaintiffs contend that the step of testing does not necessarily include fetching a control word associated with the selected format and that Katz disclosed other types of testing in the specifications that perform this step of the claims. The plaintiffs contend that a test may apply to groups or categories of formats, or to all of the formats. The defendants contend that the testing step cannot ***630** perform the function of excluding a caller from accessing any formats at all but rather, the testing step determines whether conditions specific to the selected format are satisfied.

The claim language of the testing step is helpful, but not conclusive. The language of the claims does not clearly indicate what the step of testing the selected format involves. The Conditional Format Claims recite "testing *the selected* format," which indicates that the test is performed on one particular format that has in some way been selected. The claim language does not indicate whether or not the same test could be given to a group of formats or if all formats could be tested for a single caller at the same time. Claims 11, 12 and 13 of the '150 patent, which like Claim 15 depend on Claim 10, add the steps of "fetching control data addressable with said call data for use in the step of testing," "composing a control word defining conditions for interfacing," and "fetching data to specify time constraint conditions." These claims specifically call out the steps of composing a control word and fetching control data, which suggests, consistent with the concept of claim differentiation, that the concept of control data is not necessarily implicit in the testing step of independent Claim 10. The claim language does not preclude the possibility that testing other than based on a control word could be encompassed in the testing step. Thus, the analysis must proceed to the respective specifications.

The specifications of the patents describe three main types of testing that are performed on calls. The first type of testing is performed using a control word or control data, which is available for each format and imposes any conditions on accessing the format. *See* Column 5, lines 21 though 25 of the '150 patent. Column 6 lines 54 through 57 of the '285 patent provides that "a control word is available for each operating format of the processor P and is utilized to impose the conditions for an interface and the terms of any associated billing." Similarly, in Column 9, lines 3 through 7, the specification provides "each of the operating formats has a control word for defining any access conditions or limitations to accomplish a specific format." Katz explains that the control words are bits in the control register which indicate the presence and content of conditions associated with a format. *See* Column 9, lines 27 through 37 of the '285 patent. For example, Katz describes test conditions based on the time of the call, the calling history of the caller, and the demographics of the caller. *See* Column 9, line 37 through Column 10, line 9 of the '285 patent.

The specification also discusses testing or conditioning calls as a group. For example, the specification provides "the [historical] record might take the form of either a negative or a positive file (for an individual format). In that regard, formats involving 'pay to dial' calls might be conditioned as a group." Column 5, line 64 through Column 6, line 2 of the '150 patent. Katz also describes "decimal equivalent coding" as a way to condition formats as a group. Katz states that all formats of a particular type may be assigned in a "decimal series," such that all lotteries would be assigned a number in a "100" series, e.g., 101, 102, 103, etc. For example, a caller's ANI may be associated with a decimal series which would exclude that caller from participation in any formats in that decimal series. *See* Column 10, lines 27 through 30 of the '285 patent. The specification provides that decimal equivalent coding "enable[s] a substantial number of formats to be designated and coded with respect to various classifications." Column 8, lines 5 through 17 of the '150 patent; Column 10, lines 10 through 30 of the '285 patent.

Katz also discussed what he refers to as the validity bit check. The validity bit check compares the ANI, or calling number, of the caller to a list of ANIs that are stored in memory. If it is a negative list and the caller's ANI appears on the list, ***631** the caller will be denied access to the Katz system regardless of the format. If it is a positive list, the caller's ANI must appear on the stored list in order to access the Katz system regardless of the format. *See* Column 4, line 60 through Column 5, line 5 of the '150 patent. It is also possible that the calling equipment may appear on a stored list which determines a caller's access to any of the formats. *See* Column 5, lines 1 through 14 of '150 patent.

It appears both side agree that Claim 24 of the '285 patent corresponds to the validity bit check described in the specification. The claim provides for "storing a record of negative file data, said select processing format using said additional call data signals to access said record and obtain data to specify and test for negative file conditions." The defendants say that Claim 24 does not alter the testing step of the independent claim; rather, the defendants argue it is an additional step that occurs before the testing step.

The Court concludes that, based on the claim language and the specifications, the testing step does not encompass testing formats as a group, such as through the decimal equivalent coding or the validity bit check disclosed in the specifications. The clear language of the claim recites testing "*the selected* " format. According to the specification, decimal equivalent coding is performed on a group of formats at one time and does not operate on the format that is selected by the call data signals. Thus, the Court invokes the legal rule that the specification may not expand the clear meaning of the claim language. As well, the specification shows that the validity bit check is based on the ANI or equipment signal of the caller and is not associated with any conditions placed on a selected format. Based on the foregoing, the Court concludes that "testing the selected format" means: the method by which it is determined whether any conditions associated with the format that has been selected by the call data signals are satisfied.

2. The Sequence of Steps in the Method Claims

The parties disagree over the sequence in which the four basic steps in the method claims, i.e., receiving call data signals, selecting a format, testing the selected format, and conditionally interfacing, must be performed. Specifically, the disagreement centers around the sequence of the selecting and testing steps. The defendants contend that there is a presumption that the steps in a method claim must be performed in the order they are listed in the claim particularly where, as here, the claim language indicates that the testing step must follow the selecting step. The plaintiffs contend that in some embodiments of the invention the testing step could be performed before the selecting step, particularly a situation where a group of formats are being tested, such as the validity bit check.

[46][47] Where the plain meaning of the claim language indicates a sequential nature to the claim steps and the specification does not suggest otherwise, the steps must be performed in the order written in the claim. *See Mantech Environmental Corporation v. Hudson Environmental Services, Inc.,* 152 F.3d 1368, 1376 (Fed.Cir.1998). The testing step provides for "testing *the selected* format," which suggests that the format must be selected before this step can occur. While the specification does indicate that the validity bit check and other testing of formats as a group may occur before the selection of the format, the Court has already concluded that the validity bit check and other group testing is not encompassed by the testing step. Given the clear language and the suggested sequence of the steps provided in the claims, the Court concludes that: the testing step must be performed after the selecting step.

There is also some disagreement over the sequence in which the additional steps other than the four basic steps should be performed in the method claims. Claim 11 ***632** calls out the additional step of "fetching control data addressable with said call data for use in the step of testing." Claims 15 calls out the additional step of "fetching data to specify demographic conditions." Thus, the Court concludes that it is clear from this claim language and the passages of the specifications discussed above regarding control words that: the steps of fetching in Claim 11 and Claim 15 must occur before the testing step.

Claim 20 of the '285 patent contains the additional steps of "selectively terminating certain select calls from said remote terminals in favor of said operator attended terminals" [FN27] and "transferring substantially all of said certain select calls from said operator attended terminals back to said multiple port, multiple format data processing system." The defendants argue that these steps must be performed after the four basic steps that appear before them in the claim.

FN27. Claim 24 of the '285 also contains the step of selectively terminating certain select calls.

Claim 24 of the '285 patent includes the steps, in addition to the four basic steps, of "providing signal-represented call data from said remote terminals including calling numbers as additional call data signals" "storing a record of negative file data, said select processing format using said additional call data signals to access said record and obtain data to specify and test for negative file conditions," and

"terminating calls from said remote terminals if said calling number matches said data obtained from said negative file data." The defendants argue that the selectively terminating step must be performed after the four basic steps and the providing step, the storing step, and the terminating step must be performed before the four basic steps are performed.

As for the additional steps in Claims 20 and 24 of the '285 patent, the defendants do not point to any passages of the specification that demonstrate that the additional steps in those claims must be performed in any particular order. There is nothing in the claim language that suggests that those steps must be performed before, after, or during the four basic steps called out in the claims. Interpreting the plain claim language, there is no reason why calls could not be transferred to a live operator or transferred back to the system at any time during a call. Similarly, there is no reason shown in the claim language why a call could not be terminated at any time if the calling number matched negative file data. Thus, the Court concludes that: the claims do not require that the additional steps of Claims 20 and 24 be performed in any particular order.

3. "Call Data Signals"

[48] The term "call data signals" which appears in the "testing the selected format" limitations also raises construction issues for the Court. In Claim 15 of the '150 patent and Claim 17 of the '285 patent, the term "call data signals" appears in the preamble and reads "call data signals, as to indicate called and calling numbers." In Claims 20 and 24 of the '285, the term "call data signals" is not limited in the preamble or elsewhere in the claim to called and calling numbers. The parties agree that in those claims, "call data signals" refers to called numbers, calling numbers, and equipment signals. *See* Column 4, lines 53 through 58 and 65 through 68 of the '285 patent.

The parties dispute the meaning of the term "equipment signals." Specifically, the defendants contend that "equipment signals" is limited to the signal disclosed in the specification, which is a signal that indicates whether the caller is using a touch tone telephone or a rotary dial telephone. Column 3 lines 65 through 68 of the '150 provides that "the call data may specifically include digital signals representative of the called number, the calling number (terminal number) and the terminal equipment." Column 4, lines 10 through 28 of the '150 patent provides that call data may be provided by the communication *633 facility for the called number, the calling number, and "equipment, e.g. [*exempli gratia*] 'pulse' or 'tone' terminal." These passages of the specification do not require that the equipment signal only indicate whether the caller is calling from a pulse or tone terminal.

Column 11, lines 28 through 36 of the '285 patent provides that "[t]he bits '29' and '30' comprise a field 83 and may actuate a special form of the selected format. In the disclosed embodiment, the field 83 registers call data, as to indicate that the calling terminal is a 'pulse' (rotary dial) signal unit or a 'tone' (touch) signal unit." Field 83 in Figure 5 is labeled "equip." The plaintiffs argue that by dedicating two bits in memory for the equipment signal, Katz indicated that equipment signals may encompass more than touch tone or rotary, because only one bit would have been required to store that information. In light of the specification and Figure 5, the Court concludes that "equipment signal" is not limited to a signal indicating whether the caller is using a touch tone or rotary phone and means: a signal that provides information about the equipment from which the caller is making a call.

Another dispute the parties raised in connection with the term "call data signals" is which call data signals may be the basis for a test in the testing step. The defendants argue that the only call data signal that can be tested in the testing step is DNIS. The defendants argue that the equipment signal cannot be tested because equipment signals for touch tone or rotary phones did not exist at the time of the Katz patents. Putting aside whether an equipment signal that indicated rotary or touch tone phones existed at the time of the Katz patents, the specification clearly indicates that the equipment signal may be the basis for disqualifying callers from interfacing with a format. *See* Column 5, lines 1 through 4 of the '150 patent. The claims language of the testing step is "testing the selected format in relation to said call data signals." Although Claim 15 of the '150 patent and Claim 17 of the '285 patent do not include equipment signals from the scope of call data signals in the preamble, there is no basis in the claim language or the specifications to conclude that the call data signals in the testing steps in Claim 20 and 24 of the '285 cannot include the equipment signal.

The defendants also argue that ANI cannot be included in the call data signals of the testing step because Katz disclaimed coverage for testing ANI in the prosecution history. The specifications clearly indicate that a caller's ANI may be used to disqualify him from interfacing with a format. *See* Column 4, lines 61 through 68 of the '150 patent. In the June

23, 1993 Supplemental Preliminary Amendment during the prosecution of the '285 patent, Katz distinguished his invention from a patent to Fisher by stating that "the patent to Fisher does not disclose receiving calls from random or unknown callers at large and limiting access upon testing *imposed conditions specified by call data including DNIS* from unknown callers." (Ex. 50) (emphasis in original). Contrary to the defendants' assertions, the Court concludes that Katz's statement, "call data including DNIS," is not exclusionary or limiting language and does not exclude ANI from the term "call data signals" in the testing step. Thus, the Court concludes that: the call data signals in the testing step may include the calling number or ANI.

4. "Conditionally Interfacing"

[49] The parties also dispute the meaning of the term "conditionally interfacing the selected format." The parties agree that if the testing step is satisfied, that is, the test is performed and the conditions are fulfilled, then the caller is connected to the selected format. The defendants contend that if the conditions associated with the format are not satisfied in the testing step, the caller is not connected to the format. The plaintiffs contend that the *634 claims are silent as to what happens if the tested conditions are not satisfied.

The term "conditional interfacing" in the context of the Katz patents connotes that the caller will be connected or interfaced with the selected format if any conditions associated with that format are satisfied. The term in itself does not connote what happens to the call if the format conditions are not satisfied, other than the call will not be interfaced with the format.

The specification provides that after the tests have been performed, "[i]f the call is accepted, the process moves to initiate the selected format interface as indicated by the block 40. Conversely, if the call is to be rejected, the process moves to the step indicated by block 32, i.e. reject the call as with a message and release the line." Column 6, lines 34 through 41 of the '150 patent; Column 8, lines 4 through 6 of the '285 patent (identical provision). Figure 2 of the '285 and '150 patents, which are flow diagrams illustrating the operating process of the system, indicate that if the tests are not correlated, i.e. the conditions are not met ("No" at 48), the call flows in the direction of the arrow to 32, and the caller receives a reject message (32) and the line is released (34).

The specifications indicate that one possible result from a call in which the conditions associated with the selected format are not satisfied is that the call will be rejected and the line released. However, there is nothing in the specifications or the claim language that requires a call to follow the disclosed embodiment in Figure 2 and the specifications reciting the embodied result of rejecting the call and releasing the line. Further, the term "conditionally interfacing" does not in itself raise the question as to what happens to the call if the conditions are not satisfied other than that the call it not interfaced with a format, and there is no other language in the claims that otherwise restricts what happens to a call if the conditions of a format are not satisfied. The Court will not import the limitation on the claim language proposed by the defendants from the specification because there is no "hook" in the claim language on which such a limitation can hang. *See* Renishaw PLC v. Marposs Societa' per Azioni, 158 F.3d 1243, 1248, 1252 (Fed.Cir.1998). Thus, the Court concludes that the claims does not require that the call be terminated if the conditions are not satisfied and the call is not interfaced.

Based on the foregoing, the Court construes the term "conditionally interfacing" to mean: connecting a call to the selected format once any conditions associated with that format have been satisfied.

5. "Live Operator Attended Terminals"

[50] The dispute surrounding the term "live operator attended terminals" centers on whether the prompts provided to the live operators must be identical to the vocal prompts in the automated formats. The plaintiffs contend that the prompts need only assist the operator with the call; the defendants contend that the prompts must simulate the automated format completely.

The claim language does not restrict the prompts displayed to live operator attended terminals in any way. The language of most of the claims at issue from the '285 patent calls out "a plurality of live operated attended terminals." Claim 17 of the '285 patent merely refers to "one of a plurality of operator stations with prompting capability."

As well, the specification does not indicate that the prompts to the live operator must mimic the automated formats. In Column 3, lines 20 through 24 of the '285 patent, the specification indicates that the processor provides formats to automate an interface or prompt a live operator at an operator station. In Column 5, lines 25 through 27 of the '285

patent, the specification provides that the operator station upon receiving a call receives and displays prompting format data for the attending *635 operator. Similarly, Column 6, lines 10 through 14 of the '285 patent indicates that when a caller is coupled to an operator station, the appropriate format data is transferred to the station for prompting the operator.

The Court concludes that: there is no indication in the claim language or the specification that the prompts displayed at the operating stations must be identical to the vocal prompts used in the automated formats. Thus, the Court concludes that: the Claims at issue are not restricted in that way.

6. "Selecting a Processing Format"

[51] The dispute surrounding this limitation is over which data signals control the selection of the format. As discussed above, in Claim 15 of the '150 patent and Claim 17 of the '285 patent, the limitation which reads "selecting a processing format of said multiple port, multiple format processing system for the calling remote terminal under control of said data signals as the selected format" indicates that the format is selected by the called and calling number, because "said" data signals are listed in the preamble of the claim as the called and calling number. However, in Claims 20 and 24 of the '285 patent, the data signals are not limited in the preamble of the claim; thus call data signals refers to the calling number, the called number, and the equipment signal.

The parties appear to agree that, despite the claim language "data signals," the only call data signal that selects the format is DNIS, or the called number. The specifications support this position. *See* Column 4 lines 30-31 of the '285 patent ("[T]he call unit CU might be reached by any of twenty telephone dialing numbers, each associated with a specific operating format of the processor P. One called number or set of numbers might be associated with an auction format of the processor P."); Column 5, lines 18 through 24 of the '150 patent ("If a positive validity bit ('1') is formed at the junction of the query block 30, a control word is fetched under command of the called number as indicated by the block 36."); Column 7, lines 13 through 19 of the '150 patent ("The control register 70 receives format control words specified by the called number and having a form as illustrated in Fig. 4."). The Court agrees that despite the use of the broad term "call data signals" in the claim language, it is clear in the context of the patent as a whole that the only call signal that could be used to select a format is the called number or DNIS.

7. "Demographic Conditions"

[52] Claim 15 of the '150 patent recites "[a] process according to claim 11 wherein said step of fetching control data includes fetching data to specify demographic conditions." The parties disagree over the construction of the term "demographic conditions." The plaintiffs argue that "demographic conditions" refers to conditions based on the geographic location of the caller. The defendants contend that "demographic conditions" pertain only to the area code of the caller.

It is clear from the specification that the term "demographic conditions" does not have its ordinary and common meaning in the context of the Katz patents, as both parties agree. In the context of discussing various tests or conditions that may be imposed, the specification provides that "[m]oving from the historic considerations, demographic tests may be specified as in relation to the geographic area manifest by the area code of the calling number." Column 6, lines 24 through 27 of the '150 patent. *See also* Column 12, lines 19 through 25 of the '150 patent. Katz lists several examples of "demographic conditions" in Column 7, lines 61 through 68 of the '150 patent. While all of the examples are conditions limiting calls based on a particular area code, one of the examples is a condition that limits calls to ANIs from a particular area code with particular prefix numerals.

*636 The Court concludes that although the specification discusses demographic conditions in terms the area codes of the calling numbers, there is nothing in the specification that indicates that an area code can be the *only* basis for a demographic condition. Indeed, in one of the examples provided in the specification by Katz, the callers' area codes are used in conjunction with the prefix numerals of the calling numbers to indicate the callers' geographic area and limit the calls from a particular area. This convinces the Court that "demographic conditions" are not restricted to conditions based on the callers' area codes only. Thus, the Court construes the term "demographic conditions" to mean: conditions used to limit a call based on the caller's geographic area.

8. "Means for Directly Forwarding"

[53] Claim 77 of the '285 is an apparatus claim and contains a limitation which reads "means for directly forwarding a call coupled to said interface means for forwarding a call from any one of said remote terminals to one of said plurality of live operator

attended terminals under control of said call data signals when said remote terminals do not have the capability to digitally provide data."

The parties agree that this limitation is subject to means plus function analysis under § 112, ¶ 6. The function performed by the "means" is directly forwarding a call from a remote terminal to a live operator attended terminal. The defendants argue that although there is no structure that is clearly linked in the specifications to the function disclosed in the claims, this Court should identify the switch SW, line capture unit 62, call register 68, and the control unit 66 from Figures 1 and 3 of the '285 patent as the structures that correspond to the means.

Figure 3 illustrates elements of the switch SW in Figure 1. *See* Column 8, lines 32 through 34 of the '285 patent. Column 8, lines 50 through 57 of the '285 patent describes some of the elements of Figure 3 and provides that "[t]he line capture unit 62 also is connected to a control unit 66. Structurally, the control unit 66 may take the form of various computer facilities incorporating memory and logic capability to sequence and control specific functions.... Generally the control unit 66 implements specific formats which may involve coupling a caller either to a live operator station OS1--OSn or to the processor P." Column 12, lines 55 through 59 of the '285 patent indicates that "[i]f the call register 68 does not receive a validity '1' bit, the calling number is indicated to be barred with a consequence that the line is released by the control unit 66."

The Court concludes that based on the specifications, the structure that corresponds to the means is generally the switch SW in Figure 1 and specifically the control unit 66 in Figure 3. Based on the their descriptions in the specifications, the Court concludes that the other structures identified by the defendants, the line capture unit 62 and the call register 68, do not perform the function of directly forwarding a call from a remote terminal to a live operator attended terminal recited in the claim.

The defendants argue that because the claim also requires that the forwarding occur "when said remote terminals do not have the capability to digitally provide data," it does not apply in a situation in which a caller with a touch tone telephone fails or chooses not to push a button on the telephone. The Court concludes that in light of the ordinary and common meaning of the term "capability," this claim means that: a caller is switched to a live operator only when the remote terminal from which the caller is calling is not technically capable of digitally providing data.

D. CLAIMS FROM THE '984 PATENT

The parties have presented Claims 4 and 15 of the '984 patent to the Court for *637 construction. The text of these claims appears in full in the Appendix.

In general, the '984 patent describes a system for use with a telephone network that controls callers' access to interactive voice applications to prevent misuse. The system can restrict callers' access to interactive voice applications by qualifying calls in different modes, such as "800" mode, "900" mode, or area code mode.

1. Claim 4

a. "First Response Unit Means"

[54] The first term presented by the parties to the Court for construction from the '984 patent is "first response unit means." The term in context reads "first response unit means for receiving calls in said '800' call mode." The plaintiffs argue that this term is not subject to means-plus-function analysis, despite the use of the word "means."

The Court concludes that "first response unit means" is not subject to means plus function analysis, despite the presumption to the contrary due to the word "means." The article presented by the plaintiffs, entitled "AT & T 2: Reaches Agreement with Rockwell" and dated August 26, 1986, discusses the use of audio response units in merging computer speech technology with automatic call distribution systems. (Ex. 362). The Court concludes that this article demonstrates that the term "audio response unit" or "ARU" was used by people in the art of computer telephony and would have connoted sufficient structure to those of ordinary skill in the art at the time. *See* Greenberg v. Ethicon Endo-Surgery, Inc., 91 F.3d 1580, 1583 (Fed.Cir.1996).

The parties also dispute the meaning of the term "800 call mode" which appears in the same limitation. The plaintiffs contend that this term encompasses "800," "888," and other "toll-free" calls. The defendants agree with this construction, but argue that the term encompasses any call in which the charges are reversed and the call is free to the caller, including foreign access calls and "collect" calls.

Column 1, line 66 through Column 2, line 2 of the '984 patent provides that "[t]elephone calls may be

accommodated without charge using '800' service or calling mode. Generally, the '800' calling mode accommodates free calls by callers in various areas to a particular station incurring the charges." The Court concludes that it is not proper to determine at the construction stage whether "foreign access calls" and the like are specifically encompassed in the term "800 call mode." The Court agrees with the parties that the proper construction of "800 call mode" is: a toll-free call, ie. a call in which the caller is not charged for the call, such as an "800" or "888" call and the like.

b. "Qualification Means"

[55] The term "qualification means" appears in context as "qualification means for qualifying said calls in said '800' call mode received by said first response unit to provide qualified calls." The parties agree that this term is subject to means-plus-function analysis under § 112, ¶ 6.

Column 4 lines 9 through 14 of the '984 patent provide that "with overall supervision by the control unit 28, the audio response units, 18, 20, and 22 answer and preliminarily qualify callers from the terminals T1-TN for connection through the coupler 24 to the interface processor 26." Column 4, lines 47 through 50 provide that " '[t]he audio response unit 18 is coupled to a free-call memory 32.' Generally, the unit 18 in cooperation with the memory 32 operates with the control unit 28 to qualify acceptable calls in the '800' mode."

The Court concludes that "qualification means" is subject to means-plus- function analysis. The Court concludes that the structures which correspond to the means and perform the function of qualifying said calls in '800' call mode are the audio response unit 18, control unit 28, and the free-call memory 32 in Figure 1 and the ***638** required software to perform the function of qualifying callers.

c. "Second Response Unit Means for Receiving Calls in a Second Call Mode"

[56] The third limitation in Claim 1 of the '984 patent, upon which Claim 4 depends, provides for a "second response unit means for receiving calls in a second call mode." The parties dispute the meaning of the term "second call mode." The plaintiffs contend that the second call mode could encompass anything other than the 800 call mode, which is called out in the first limitation of the claim. The defendants contend that the second call mode must encompass a 900 call mode because a 900 call mode is called out in the preamble to the claim.

The preamble of Claim 4, which appears Claim 1, reads in part "[a] telephone call processing system for receiving calls from a multitude of terminals in different call modes including an '800' call mode and a '900' call mode." The central dispute is whether the recitation of " '900' call mode" in the preamble is a limitation on the claim such that the second call mode called out in the third limitation must be a 900 call mode.

[57] In determining whether the preamble is an additional limitation to the claim, a court must divine the function that the words of the preamble serve. If the claim preamble recites structural limitations of the invention, a court should consider the preamble a limitation on the claim. *See* Rowe v. Dror, 112 F.3d 473, 478 (Fed.Cir.1997). If the claim preamble recites a purpose or intended use for the invention in the preamble and the claim body recites a structurally complete invention, the preamble is not a claim limitation. *Id.* The patent as a whole should be reviewed to determine whether the preamble is structural or a mere statement of the purpose or use of the invention. *Id.*

The preamble of Claim 1 of the '984' patent calls out a system "for receiving calls from a multitude of terminals in different call modes including an '800' call mode and a '900' call mode." This quoted language does not invoke or refer to any structure of the invention. Similarly, the second response unit limitation recites that the second response unit receives calls in a second call mode. This language describes no structure as well. Thus, the Court concludes that the plain language of the Claim 1 indicates that the term "900 call mode" describes a function of managing the calls or a use of the invention, rather than a structural component of the system.

The specification is consistent with the claim language. Column 1, lines 54 through 66 of the '984 patent provides that

> [t]he '900' calling mode is useful for implementing games and contest with telephone interface systems; however, certain problems are encountered. Specifically, certain telephone terminals, e.g. pay phones, do not accommodate '900' service. Also, with respect to certain forms of games and contests, it is important to offer members of the public an alternative 'free' method of participation. In general, the system of the present invention may be employed to implement '900' calling modes while accommodating 'free'

participation with reasonable control.

This passage indicates that the invention may be used with a 900 call mode as a method of solving the problems discussed in the specification. Column 2, lines 3 through 17 discusses the problems with using traditional area code numbers with interface systems, including the possibility that an overwhelming number of people will respond. This passage indicates that another use of the invention is addressing problems with area code calls. Thus, the Court concludes that using a 900 call mode is only one of the uses of the invention.

Based on the claim language and the specification, the Court concludes that " '900' call mode" as used in the preamble of Claim 1 is more descriptive of an intended use of the invention than of its structure, ***639** and thus, should not be construed as an additional limitation on the claim. Therefore, the Court will not construe the term "second call mode" to require the use of a "900 call mode" on this basis.

The defendants also argue that the prosecution history of the '984 patent requires that the second call mode be defined as the 900 call mode. In an Office Action dated March 21, 1991, the examiner rejected certain of Katz's claims as unpatentable over Fodale, including Claim 1. (Ex. 32). In the June 20, 1991 Amendment, Katz amended Claim 1 to specifically call out an 800 call mode and a 900 call mode in the preamble, just as the language appears in the claim as it was issued. The defendants contend that Katz included a "900 call mode" in Claim 1 in the June 20, 1991 Amendment to traverse the examiner's rejection of that claim, and thus, the term "second call mode" in the claim should be limited to the 900 call mode called out in the preamble of the claim.

The Court's careful independent review of the prosecution history, including the basis for the examiner's initial rejection of Claim 1, the amendments made by Katz, and the discussion in the amendment by Katz of the rejection of his claim as unpatentable over Fodale, reveals that the prosecution history cited by the defendants does not support their argument that "second call mode" should be limited to "900 call mode." The defendants point to no affirmative statement by Katz in his amendment that the term "second call mode" was synonymous with 900 call mode nor does the Court find any such statement by Katz. The mere addition of the term "900 call mode" in the preamble does not indicate that Katz was necessarily limiting the term "second call mode" because there is no statement in the prosecution history relating those two terms to each other. Katz did not in his June 20, 1991 submission amend in any way the use of the term "second call mode" in Claim 1, which left that limitation without reference to the term "900 call mode."

Further, in the same June 20, 1991 Amendment, Katz amended Claim 2 to specifically call out a system wherein the second response unit receives calls in 900 call mode. It may be plausibly inferred that Katz added the phrase "900 call mode" in the preamble of Claim 1 to support his amended Claim 2, rather than to specifically overcome the examiner's objection based on Fodale. Thus, the prosecution history is at best ambiguous as to why Katz added the term "900 call mode" in the preamble of Claim 1. Because Katz did not clearly disclose his intention to do so, the Court will not limit the plain meaning of the claim language based on this ambiguous prosecution history.

Based on the foregoing, the Court concludes that "second call mode" means: a call mode, such as a 900 call mode or an area code mode, other than 800 call mode. The term does not necessarily mean the 900 call mode.

d. "Means for Processing Calls in an Interface Format"

[58] The parties agree that this limitation of Claim 4 of the '984 patent is subject to § 112, ¶ 6. The function performed by the means is processing calls in an interface format. The plaintiffs identify the interface processor 26 as the corresponding structure. The defendants contend that the structures that correspond to the means are the processor 26, random number generator 40, question memory 38, caller record 44, coincidence detector 42 and gate 46 of Figure 1, plus the associated software in Figure 2. The defendants contend that the software must be configured to implement a contest that provides questions to callers, receives answers entered by the callers on the keypad of their telephones, and determines winners of the contest.

The structures identified by the defendants are discussed in Column 8, line 65 through Column 9, line 57 and Column 4, line 57 through Column 5 line 18 as part of the illustrative embodiment of a game format. ***640** In Column 6, lines 63 through 66, the specification provides that "the interface processor 26 receives the calling number and processes the contest format as described in detail below." Thus, the Court concludes that the structure that performs the function of processing calls in an interface format is the interface processor 26 of Figure 1. The Court concludes that the structures that are discussed in the

context of the game format are not necessarily required to perform the function of processing calls in an interface format, because the game format is only an example of one type of interface format.

2. Claim 15

a. "Memory Means for Storing Caller Cues and Use Indications"

[59] The plaintiffs agree that all of the limitations of Claim 15 are subject to means-plus-function analysis except for the limitation that reads "memory means for storing caller cues and use indications for said caller cues in relation to said callers as identified by said identification signals." Consistent with the Court's conclusion above in footnote 14, the Court concludes that "memory means" would have connoted sufficient structure to one of ordinary skill in the art at the time of the Katz patents such that it is not subject to analysis under § 112, ¶ 6. The Court defines "memory means" as computer hardware that stores information, such as disks, RAM, or tapes.

The defendants also contend that the "caller cues" recited in this limitation must be quiz or lottery questions, as disclosed in the specification. Similar to the defendants' argument that the term "format" should be restricted to the seven disclosed formats, the Court concludes that there is no support in the claim language or specification for limiting the ordinary and common meaning of "cues" to only questions posed in a quiz or lottery. Thus, the Court construes the term "caller cues" to mean: questions or prompts which are given to a caller.

b. "Means for Selecting a Current Caller Cue"

[60] The last limitation in Claim 15 of the '984 patent reads "means for selecting a current caller cue from said memory means for one of said currently active callers for application to said cue means under control of said identification signals for said one of said currently active callers and said use indications in said memory means for said one of said currently active callers."

There is no dispute that the term "means for selecting a current caller cue" is subject to means-plus-function analysis. The function performed by the means is "selecting a current caller cue from said memory means for one of said currently active callers. under control of said identification signals ... and said use indications." The parties' dispute centers on whether the random number generator is one of the structures that correspond to the means. The defendants contend that in addition to the gate 46, the interface processor 26, the coincidence detector 42, and the associated software, the random number generator 38 is essential to perform the function called out in the claim because the specification does not provide for a way to choose questions other than randomly. The plaintiffs contend that the specification shows that the coincidence detector 42 is the structure which decides whether a question is posed to a caller based on use indications associated with that caller.

The specification describes the process of selecting a caller cue in Column 4, lines 59 through Column 5, line 1, which provides that "[g]enerally, the interface processor 26 poses questions to calling contestants.... Questions given to contestants are selected from a memory 38 by a random number generator 40. Essentially, the memory 38 contains an inventory of questions addressable by number provided by the random number generator 40. The ***641** address numbers for the generator 40 are also supplied to a coincidence detector 42 that also receives the address numerals of questions previously presented to a specific caller from a record 44." *See also* Column 8, line 65 through Column 9, line 28.

Thus, based on these passages of the specification, the Court concludes that the "means" in "means for selecting a current caller cue" corresponds to the interface processor 26, the coincidence detector 42, the random number generator 38, and the associated software to perform the function of selecting a current caller cue from memory under control of identification signals and use indications.

III. CONCLUSION

The foregoing constitutes the Court's construction of the terms presented by the parties from the twenty claims designated for the *Markman* hearing.

An appropriate Order follows.

ORDER

AND NOW, this 26th day of August, 1999, upon consideration of the briefs, expert testimony, and oral argument presented by the parties in connection with the *Markman* hearing held from May 24, 1999 through June 4, 1999, in which counsel for all parties participated, and upon consideration of the intrinsic and extrinsic records of the patents-at-issue as indicated in the foregoing Memorandum, it is hereby **ORDERED** that the meaning and scope of the patent claims asserted to be infringed and presented by the

parties for construction are hereby determined as set forth in the foregoing Memorandum.

APPENDIX
ANALYSIS CONTROL SYSTEM CLAIMS
'309 Patent, Claim 51

46. A control system for use with a communication facility including remote terminals for individual callers, wherein each of said remote terminals may comprise a conventional telephone instrument including voice communication means, and digital input means in the form of an array of alphabetic numeric buttons for providing data, said control system comprising:

an interface structure coupled to said communication facility to interface said remote terminals for voice and digital communication, and including means to provide caller data signals representative of data relating to said individual callers developed by said remote terminals;

voice generator structure coupled through said interface structure for actuating said remote terminals as to provide vocal operating instructions to said individual callers;

record structure, including memory and control means, connected to receive said caller data signals from said interface structure for updating a file and storing digital caller data relating to said individual callers provided from said digital input means through said interface structure; and

qualification structure controlled by said record structure for testing caller data signals provided by a respective one of said individual callers to specify a consumable participation key for restricting the extent of access to said system to limit data stored from said respective one of said individual callers on the basis of entitlement.

51. A system according to claim 46 wherein said qualification structure restricts the extent of access by said respective one of said individual callers to a single use entitlement.

'707 Patent, Claim 33

26. An analysis control system for sue with a communication facility including remote terminals for individual callers, wherein each of said remote terminals may comprise a conventional telephone instrument including voice communication means and digital input means in the form of an array of alphabetic numeric buttons for ***642** providing data and wherein said communication facility has a capability to automatically provide calling number identification data for at least certain of said individual callers, said analysis control system comprising:

an interface structure coupled to said communication facility to interface said remote terminals for voice and digital communication;

voice generator structure coupled through said interface structure for actuating said remote terminals as to provide vocal operating instructions to said individual callers;

record structure, including memory and control means, connected to receive said calling number identification data provided automatically by said communication facility for at least certain of said individual callers, for accessing a file, and storing additional digital data provided by said callers; and

qualification structure controlled by said record structure for testing said calling number identification data to specify a basis for entitlement defining a limit on use, for restricting the extent of access to said system for a respective one of said certain of said individual callers.

33. An analysis control system according to claim 26, wherein said limit on use relates to a dollar amount.

'707 Patent, Claim 104

96. An analysis control system for use with a communication facility including remote terminals for individual callers, wherein each of said remote terminals may comprise a conventional telephone instrument including voice communication means and digital input means in the form of an array of alphabetic numeric buttons for providing data wherein said communication facility has a capability to provide call data signals indicative of calling number identification data for at least certain of said individual callers, said analysis control system comprising:

interface structure coupled to said communication facility to interface each of said remote terminals for voice and digital communication, and including means to provide signals representative of data developed by said remote terminals and for receiving said calling number identification data;

voice generator structure coupled through said interface structure for actuating said remote terminals as to provide vocal operating instructions to said individual callers;

record structure, including memory and control means, connected to said interface structure for accessing a file and storing data relating to certain select ones of said individual callers in accordance with said calling number identification data;

qualification structure controlled by said record structure for controlling access to said system by said individual callers; and
means for processing at least certain of said data developed by said terminals and said calling number identification data relating to certain select ones of said individual callers.

103. A system according to claim 96 for use with a communication facility having a capability (DNIS) to provide called number identification data to identify a called number form a plurality of different numbers for calling, and further including means for selecting a specific one of a plurality of formats of said interface structure.

104. A system according to claim 103, wherein said called number identifies a specific one of a plurality of operating formats for interface.

'707 Patent, Claim 117

96. An analysis control system for use with a communication facility including remote terminals for individual callers, wherein each of said remote terminals may *643 comprise a conventional telephone instrument including voice communication means and digital input means in the form of an array of alphabetic numeric buttons for providing data wherein said communication facility has a capability to provide call data signals indicative of calling number identification data for at least certain of said individual callers, said analysis control system comprising:
interface structure coupled to said communication facility to interface each of said remote terminals for voice and digital communication, and including means to provide signals representative of data developed by said remote terminals and for receiving said calling number identification data;
voice generator structure coupled through said interface structure for actuating said remote terminals as to provide vocal operating instructions to said individual callers;
record structure, including memory and control means, connected to said interface structure for accessing a file and storing data relating to certain select ones of said individual callers in accordance with said calling number identification data;
qualification structure controlled by said record structure for controlling access to said system by said individual callers; and
means for processing at least certain of said data developed by said terminals and said calling number identification data relating to certain select ones of said individual callers.

115. A system according to claim 96, wherein said individual callers provide other data.

116. A system according to claim 115, wherein said individual callers provide caller credit card number data as said other data.

117. A system according to claim 116, wherein said individual callers provide expiration data for caller credit card number data.

'707 Patent, Claim 192

183. An analysis control system for use with a communication facility including remote terminals for individual callers, wherein each of said remote terminals may comprise a conventional telephone instrument including voice communication means and digital input means in the form of an array of alphabetic numeric buttons for providing data and wherein said communication facility has a capability to provide calling number identification data, said analysis control system comprising:
interface structure coupled to said communication facility to interface said remote terminals for voice and digital communication and including means to receive caller data signals representative of data relating to said individual callers, including caller personal identification data and said calling number identification data provided automatically from said communication facility;
voice generator structure coupled through said interface structure for actuating said remote terminals as to provide vocal operating instructions to said individual callers and to prompt said individual callers to enter data;
record testing structure connected to receive and test said caller data signals including said calling number identification data and said caller personal identification data against previously stored calling number identification and caller personal identification data; and
analysis structure for receiving and processing said caller data signals under control of said record testing structure.

191. An analysis control system according to claim 183, wherein said communication facility automatically provides called number identification data (DNIS) to identify a select called number from a plurality of called numbers.

*644 192. An analysis control system according to claim 191, wherein said select called number (DNIS) identifies a select format from a plurality of distinct

operating formats.

'863 Patent, Claim 49

27. An analysis control system for use with a communication facility including remote terminals for individual callers, wherein said remote terminals may comprise a conventional telephone instrument including voice communication means, and digital input means in the form of an array of alphabetic numeric buttons for providing data, said analysis control system comprising:

interface structure coupled to said communication facility to interface said remote terminals for voice and digital communication, and including means to provide caller data signals representative of data relating to said individuals callers developed by said remote terminals and including means to receive called number identification signals (DNIS) automatically provided by said communication facility to identify a select one of a plurality of different called numbers associated with a select format of a plurality of different formats;

record structure, including memory and control means, said record structure connected to receive said caller data signals from said interface structure for accessing a file and storing certain of said data developed by said remote terminals relating to certain select ones of said individual callers;

qualification structure coupled to said record structure for qualifying access by said individual callers to said select format based on at least two forms of distinct identification including callers customer number data and at least one other distinct identification data element consisting of personal identification data provided by a respective one of said individual callers; and

switching structure coupled to said interface structure for switching certain select ones of said individual callers at said remote terminals to any one of a plurality of live operators wherein said live operators can enter at least a portion of said caller data relating to said select ones of said individual callers through interface terminals, which is stored in said record structure.

49. An analysis control system according to claim 27, wherein an additional form of distinct identification is provided by said individuals callers on-line and is stored for subsequent use.

'863 Patent, Claim 50

50. A system according to claim 27, wherein said qualification structure further executes a test for unacceptable customer numbers based upon data developed by said remote terminals indicative of said caller customer numbers.

27. (See above).

'863 Patent, Claim 65

65. An analysis control system for use with a communication facility including remote terminals for individual callers, wherein each of said remote terminals may comprise a conventional telephone instrument including voice communication means, and digital input means in the form of an array of alphabetic numeric buttons for providing data, said analysis control system comprising:

an interface structure coupled to said communication facility to interface said remote terminals for voice and digital communication, and including means to provide caller data signals representative of data relating to said individual callers developed by said remote terminals and including means to automatically receive called number identification signals (DNIS) to identify a select format from a plurality of formats;

voice generator structure coupled through said interface structure for actuating said remote terminals as to ***645** provide voice operating instructions to said individual callers;

record structure, including memory and control means, said record structure connected to receive said caller data signals from said interface structure for accessing a file and storing digital caller data relating to said individual callers provided from said digital input means through said interface structure; and

qualification structure for testing caller data signals provided by at least one of said individual callers to specify a consumable participation key, said consumable participation key for use during a single predetermined period of time for restricting the extent of access to at least a portion of said system by said one of said individual callers on the basis of entitlement.

'863 Patent, Claim 171

93. An analysis control system for use with a communication facility including remote terminals for individual callers, wherein each of said remote terminals may comprise a conventional telephone instrument including voice communication means and digital input means in the form of an array of alphabetic numeric buttons for providing data and wherein said communication facility has a capability to provide call data signals indicative of calling number identification data and called number

identification data for at least certain of said individual callers, said analysis control system comprising:

interface structure coupled to said communication facility to interface each of said remote terminals for voice and digital communication, and including means to provide signals representative of data developed by said remote terminals and for receiving said calling number identification data and said called number identification data (DNIS) to identify one from a plurality of called numbers;

voice generator structure coupled though said interface structure for actuating said remote terminals as to provide vocal operating instructions to said individual callers;

record structure, including memory and control means, said record structure connected to said interface structure for accessing a file and storing data relating to certain select ones of said individual callers in accordance with said calling number identification data;

qualification structure controlled by said record structure for controlling access to said system by said individual callers; and

means for processing at least certain of said data developed by said remote terminals relating to certain select ones of said individual callers.

169. An analysis control system according to claim 93, wherein said data relating to certain select ones of said individual callers includes credit card number data.

171. An analysis control system according to claim 169, wherein said credit card number data is tested against unacceptable credit card numbers.

CLAIMS INVOLVING PRODUCTS CARRYING PARTICIPATION NUMBERS

'707 Patent, Claim 44

37. A process for controlling operations of an interface with a telephonic communication system including remote terminals for individual callers, wherein each of said remote terminals may comprise a conventional telephone instrument including voice communication means and digital input means in the form of an array of alphabetic numeric buttons for providing data and wherein said telephonic communication system has a central capability to automatically provide call data signals, indicative of calling number identification data (DNIS) or both, said process including the steps of:

***646** providing products carrying participation numbers specifying limits on use to entitle individual callers to access said operations of the interface with said telephonic communication system;

receiving said call data signals indicative of called number identification data including a called number (DNIS) dialed by a respective one of said individual callers to select a specific operating format from a plurality of operating formats of said operations of the interface;

coupling said remote terminals to said interface for providing voice signals to said individual callers and generating said voice signals for actuating said remote terminals as to provide vocal operating instructions to specific ones of said individual callers;

receiving digital identification data from said individual callers responsive to said voice signals including said participation numbers for said individuals callers and answer data developed by said remote terminals under control of said individuals callers;

qualifying said individual callers by testing to determine if said individual callers are entitled to access said operations of the interface based on said limits on use specified by said participation numbers for said individual callers and accordingly providing approval signals for qualified individual callers;

conditionally accessing a memory with said participation numbers and storing data relating to calls from said individual callers;

processing at least certain of said answer data responsive to said approval signals; and

providing on-going accounting data to said individual callers at intervals during calls from said individual callers.

44. A process for controlling operations of an interface with a telephonic communication system according to claim 37, further comprising the step of:

invalidating on-line said participation numbers after said limits on use specified by said participation numbers are reached.

'707 Patent, Claim 93

69. A process for controlling operations of an interface with a telephone communication system, said process including steps of:

providing products carrying participation numbers specifying limits on use to entitle individual callers to access said operations of the interface with said telephone communication system;

coupling remote terminals to said interface for providing voice signals to said individual callers and generating said voice signals for actuating said remote terminals as to provide vocal operating

instructions to specific ones of said individual callers;
receiving digital identification data from said individual callers responsive to said voice signals including said participation numbers for said individual callers and answer data provided from said remote terminals under control of said individual callers;
qualifying said individual callers by testing to determine if said individual callers are entitled to access said operations of the interface based on said limits on use specified by said participation numbers for said individual callers and accordingly providing approval signals for qualified individual callers;
accessing a memory with said participation numbers for said individual callers and storing data relating to calls from said individual callers;
***647** processing at least certain of said answer data responsive to said approval signals.

93. A process for controlling operations of an interface with a telephone communication system according to claim 69, wherein said participation numbers are numbers coded for verification.

'863 Patent, Claim 79

79. A process for controlling operations of an interface with a telephonic communication system including remote terminals for individual callers, wherein each of said remote terminals may comprise a conventional telephone instrument including voice communication means and digital input means in the form of an array of alphabetic numeric buttons for providing data and wherein said telephonic communications system has a capability to automatically provide call data signals indicative of calling number identification data or called number identification data (DNIS) or both, said process including the steps of:
providing products carrying concealed participation numbers specifying limits on use to entitle said individual callers to access said operations of the interface with said telephonic communications system;
receiving said call data signals indicative of called number identification data including a called number (DNIS) dialed by individual callers to select a specific operating format from a plurality of operating formats of said operations of the interface;
coupling remote terminals to said interface for providing voice signals to said individual callers and generating said voice signals for actuating said remote terminals as to provide vocal operating instructions to specific ones of said individual callers;
receiving digital identification data from said individual callers responsive to said voice signals including said participation numbers and answer data provided from said remote terminals under control of said individual callers;
qualifying said individual callers by testing to determine if said individual callers are entitled to access said operations of the interface based on said limits on use specified by said participation numbers and accordingly approving qualified individual callers;
conditionally aborting interaction during said operations of the interface with an individual caller at an [sic] remote terminal and coupling said remote terminal to an interface terminal under predetermined conditions for direct personal communication;
accessing a memory with said participation numbers and storing data relating to calls from said individual callers; and
processing at least certain of said answer data responsive to approving said qualified individual callers.

'863 Patent, Claim 190

188. A process for controlling operations of an interface with a telephone communications system, said process including the steps of:
providing products carrying key numbers for participation specifying limits on use to entitle individual callers to access said operations of the interface with said telephone communications system;
coupling remote terminals to said interface for providing voice signals to said individual callers and generating said voice signals for actuating said remote terminals as to provide voice operating instructions to specific ones of said individual callers;
receiving digital identification data from said individual callers responsive to said voice signals including said key numbers for said individual callers and answer data provided from said ***648** remote terminals under control of said individual callers;
qualifying said individual callers by testing to determine if said individual callers are entitled to access said operations of the interface based on said limits on use specified by said key numbers for said individual callers and accordingly providing approval signals for qualified callers;
accessing a memory with said key numbers for said individual callers and storing data relating to calls

from said individual callers; and
providing certain of said voice signals to said individual callers to indicate computer generated number data formed during operations of the interface.

189. A process according to claim 188, wherein said computer generated number data is stored in said memory.

190. A process according to claim 189 wherein said computer generated number data is stored in association with said digital identification data.

CONDITIONAL FORMAT CLAIMS
'150 Patent, Claim 15

10. A process for interfacing a telephonic communication system including remote terminals with a multiple port, multiple format data processing system, said multiple port, multiple format data processing system for concurrently processing data from said remote terminals according to a plurality of formats, at least one of said formats having at least one condition for a calling terminal, and wherein said telephonic communication system provides call data signals, as to indicate called and calling numbers, said process including the steps of:
receiving said call data signals from said telephonic communication system for a calling remote terminal;
selecting a processing format of said multiple port, multiple format processing system for the calling remote terminal under control of said data signals as the selected format;
testing the selected format in relation to said call data signals; and
conditionally interfacing said selected format to a calling terminal under control of said testing of call data signals.

11. A process according to claim 10 further including the step of fetching control data addressable with said call data for use in the step of testing.

15. A process according to claim 11 wherein said step of fetching control data includes fetching data to specify demographic conditions.

'285 Patent, Claim 17

17. A process for interfacing (1) a telephonic communication system including remote terminals either with (2) a multiple port, multiple format data processing system, said multiple port, multiple format data processing system for concurrently processing data from said remote terminals according to a plurality of formats at least one of said formats at lease one condition for a calling terminal, or (3) one of a plurality of operator stations with prompting capability for a plurality of formats, and wherein said telephonic communications system provides call data signals, as to indicate called and calling numbers, said process including the steps of:
receiving said call data signals from said telephonic communications system for a calling remote terminal indicative of DNIS and ANI automatically provided by said telephonic communications system;
selecting a processing format either for said multiple port, multiple format processing system or one of said plurality of operator stations for the calling remote terminal under control of said data signals as the selected format;
testing the selected format in relation to said call data signals; and
*649 conditionally interfacing said calling terminal to said multiple port, multiple format data processing system for execution of said selected format or to one of said plurality of operator stations under control of said testing of call data signals.

'285 Patent, Claim 20

20. A method for interfacing (1) a telephonic communications system including individual remote calling terminals for individual callers with (2) a multiple port, multiple format data processing system, said multiple port, multiple format data processing system for concurrently processing data from said remote terminals according to a plurality of formats, at least of one said formats having at least one specified condition for said remote terminals calling to interface said data processing system, and (3) a plurality of live operator attended terminals and wherein said telephonic communication system includes the capability of providing call data signals, said method comprising the steps of:
receiving said call data signals from said telephonic communications system for said remote terminals calling to interface said data processing system including DNIS automatically provided by said telephonic communication system;
selecting for said remote terminals a select processing format from said plurality of formats of said multiple port, multiple format data processing system under control of said call data signals including DNIS provided by said telephonic communications system;
testing said select processing format in relation to

said call data signals;
conditionally interfacing said selected processing format to said remote terminals selectively terminating certain select calls from said remote terminals in favor of said operator attended terminals; and
transferring substantially all of said certain select calls from said operator attended terminals back to said multiple port, multiple format data processing system.

'285 Patent, Claim 24

19. A method for interfacing (1) a telephonic communications system including individual remote calling terminals for individual callers with (2) a multiple port, multiple format data processing system, said multiple port, multiple format data processing system for concurrently processing data from said remote terminals according to a plurality of formats, at least of one said formats having at least one imposed condition for said remote terminals calling to interface said data processing system and (3) a plurality of live operator attended terminals and wherein said telephonic communication system includes the capability of providing call data signals, said method comprising the steps of:
receiving said call data signals from said telephonic communications system for said remote terminals calling to interface said data processing system including DNIS automatically provided by said telephonic communication system;
selecting for said remote terminals a select processing format from said plurality of formats of said multiple port, multiple format data processing system under control of said call data signals including DNIS provided by said telephonic communications system;
testing said select processing format in relation to said call data signals;
conditionally interfacing said select processing format to said remote terminals under control of said testing in relation to said call data signals; and
selectively terminating certain select calls from said remote terminals in favor of said operator attended terminals.

***650** 22. A method for interfacing a telephonic communications system according to claim 19, further comprising the step of:
providing signal-represented call data from said remote terminals including calling numbers as additional call data signals.

24. a method for interfacing a telephonic communications system according to claim 22, further comprising the steps of:
storing a record of negative file data, said select processing format using said additional call data signals to access said record and obtain data to specify and test for negative file conditions; and
terminating calls from said remote terminals if said calling number matches said data obtained from said negative file data.

'285 Patent, Claim 77

65. An interface control system for use with, (1) a communication facility including remote terminals for individual callers to make calls, wherein said remote terminals may comprise a conventional telephone instrument including voice communication means and some of said remote terminals may further comprise digital input means for providing data, and (2) a multiple port, multiple format processor for concurrently processing data from a substantial number of callers in any of a plurality of formats, said communication facility automatically provides call data signals, as to indicate called data (DNIS), to select a particular format from said plurality of formats, and (3) a plurality of live operator attended terminals with prompting capability, for a plurality of formats, said interface control system comprising:
interface means for providing automated voice messages relating to a specific format to certain of said individual callers, wherein said certain of said individual callers digitally enter data through said digital input means;
means for directly forwarding a call coupled to said interface means for forwarding a call from any one of said remote terminals to one of said plurality of live operator attended terminals under control of said call data signals when said remote terminals do not have the capability to digitally provide data;
means for processing coupled to said live operator attended terminals for processing caller information data entered by an operator at said live operator attended terminal; and
means for storing coupled to said interface means and said processing means for storing certain select data from said caller information data entered by said operator and data entered digitally by said individual callers.

77. An interface control system according to claim 65, wherein at least one of said plurality of formats has at least one imposed condition for said remote terminals calling to interface said interface control system.

'984 PATENT CLAIMS

'984 Patent, Claim 4

1. A telephone call processing system for receiving calls from a multitude of terminals in different call modes including an "800" call mode and a "900" call mode for processing to an interface format and involving digital signals associated with said terminals as for identification or data, said system comprising:

first response unit means for receiving calls in said "800" call mode;

qualification means for qualifying said calls in said "800" call mode received by said first response unit to provide qualified calls;

second response unit means for receiving calls in a second call mode;

means for processing calls in an interface format; and

***651** means for coupling said qualified calls and said calls in a second mode to said means for processing.

4. A system according to claim 1 wherein said qualification means comprises means for testing said digital signals associated with said terminals originating said calls.

'984 Patent, Claim 15

15. A telephone interface system for individually interfacing callers at a multitude o[f] remote terminals for voice-digital communication through a telephone communication facility, said system comprising:

communication means for establishing telephone communication with currently active callers at certain of said terminals through said telephone communication facility;

means for providing identification signals to said communication means indicative of said currently active callers, said means for providing identification signals comprising means for providing at least a portion of the digits associated with a remote terminal for identification;

memory means for storing caller cues and use indications for said caller cues in relation to said callers as identified by said identification signals;

cue means for receiving said caller cues to provide voice signals through said communications means to prompt responses from said currently active of said callers in the form of digital data signals; and

means for selecting a current caller cue from said memory means for one of said currently active callers for application to said cue means under control of said identification signals for said one of said currently active callers and said use indications in said memory means for said one of said currently active callers.

63 F.Supp.2d 583

END OF DOCUMENT

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Only the Westlaw citation is currently available.

This case was not selected for publication in the Federal Reporter.

NOTE: Pursuant to Fed.Cir.R. 47.6, this order is not citable as precedent. It is public record.

Please use FIND to look at the applicable circuit court rule before citing this opinion. Federal Circuit Rule 47.6. (FIND CTAF Rule 47.6.)

United States Court of Appeals, Federal Circuit.

MARLOW INDUSTRIES, INC., Plaintiff-Appellant,
v.
IGLOO PRODUCTS CORP., Defendant-Appellee.

No. 02-1386.

May 23, 2003.

Before LOURIE, LINN, and PROST, Circuit Judges.

PROST, Circuit Judge.

***1** Marlow Industries, Inc. ("Marlow") appeals from the decision of the United States District Court for the Northern District of Texas granting summary judgment to Igloo Products Corp. and holding Marlow's United States Patent No. 4,726,193 ("the '193 patent"), as amended by Reexamination Certificate B1 4,726,193 ("the first reexamination") and Reexamination Certificate U.S. 4,726,193 C2 ("the final reexamination") unenforceable due to Marlow's inequitable conduct before the United States Patent and Trademark Office ("PTO"). *Marlow Indus., Inc. v. Igloo Prods. Corp.*, No. 396-CV-2688-P, 2002 WL 485698 (N.D.Tex. Mar. 28, 2002). Because the district court did not commit error in granting Igloo's motion for summary judgment, we *affirm* the judgment.

I

The '193 patent covers picnic boxes. Independent claim 1 reads in pertinent part "[a] refrigerator/food warmer picnic box apparatus or the like comprising ... means ... for *selectively heating and cooling* and circulating the air in the food compartment picnic box ...." (emphasis added). Marlow filed an infringement action against Igloo in September 1996 and cross-moved for partial summary judgment on September 29, 1997, claiming that, as a matter of law, several of the contested picnic boxes infringed the patent.

In an opinion dated April 3, 1998, the district court concluded, "it is obvious that the plain meaning of Claim 1 requires that the picnic box be capable of both 'heating and cooling." ' Both parties moved the court to reconsider its April 3 order. On September 1, 1998, the district court entered an order denying Marlow's motion for reconsideration, but granting Igloo's motion in part by vacating its prior ruling that some of the accused picnic boxes literally infringed the '193 patent, concluding rather that none of the accused products literally infringed the patent. The court left open several issues regarding infringement under the doctrine of equivalents.

In June 1998, Igloo requested the PTO to reexamine the '193 patent to consider prior art that was not previously considered. Marlow subsequently moved to stay further action in the district court until completion of the reexamination proceedings. Igloo's request for the final reexamination brought to the examiner's attention the pending infringement litigation in the district court between Marlow and Igloo, and included a copy of Marlow's brief in support of its September 29, 1997, motion for partial summary judgment. During the reexamination, Marlow attempted to amend the patent by adding claims 4 and 5. These claims included language that covers a picnic box, which "cools or heats" (independent claim 4) and which "only cools" (claim 5, depending from claim 4). The examiner rejected these claims pursuant to 35 U.S.C. § 305, which prohibits expanding the scope of the claimed invention during a reexamination.

Marlow then attempted for a second time to amend the patent by adding claims 6 and 7. These claims, both depending from claim 1, included language covering a picnic box, which "heats and circulates only warm air" (claim 6) and which "cools and only circulates cooled air" (claim 7). The examiner again rejected these claims as an attempt to impermissibly broaden the scope of the original patent. Marlow appealed the examiner's rejection of its claims, including the rejection of its four proposed amendments, to the Board of Patent Appeals and Interferences ("Board"). The Board affirmed the examiner's rejection of proposed claims 5-7. However, the Board reversed the examiner's rejection

of claim 4 on the basis that it, like preexisting claim 1, includes the "selectively heating and cooling" language and, thus, cannot be construed as enlarging the scope of the claimed invention.

*2 In August 2001, Igloo moved for summary judgment in the district court, in which the infringement action was pending, alleging that Marlow had committed inequitable conduct by failing to disclose to the examiner during the final reexamination of the '193 patent the court's prior claim construction of that patent. The district court determined that Marlow had failed during the reexamination to provide the examiner with the court's April 3 and September 1, 1998 orders, that these orders were material to the reexamination proceeding, and that Marlow knew or should have known that a patent examiner would have found such information material. The district court also found that Marlow failed to submit to the examiner its motion for reconsideration of the court's April 3 order, but the court did not analyze Marlow's inequitable conduct with regard to its failure to submit this document. Based upon these findings, the court concluded that Marlow engaged in inequitable conduct before the PTO. The district court therefore granted Igloo's motion for summary judgment and declared all claims of the '193 patent unenforceable.

Marlow filed a timely appeal and we have jurisdiction pursuant to 28 U.S.C. § 1295(a)(1).

II

We review the district court's grant of summary judgment *de novo,* with all justifiable factual inferences being drawn in favor of the party opposing the motion. *See Anderson v. Liberty Lobby, Inc.,* 477 U.S. 242, 255 (1986). Summary judgment is appropriate where there is no genuine issue of material fact and the moving party is entitled to judgment as a matter of law. *See* Fed.R.Civ.P. 56(c). Under *Anderson,* whether a given factual dispute requires submission to a jury must be guided by the substantive evidentiary standards that apply to the case. 477 U.S. at 255. It is the substantive law's identification of which facts are critical and which facts are irrelevant that governs whether a genuine issue of material fact exists. *Id.* at 247-48.

It is well settled that patent applicants are required to prosecute patent applications "with candor, good faith, and honesty ." *Molins PLC v. Textron, Inc.,* 48 F.3d 1172, 1178, 33 USPQ2d 1823, 1826 (Fed.Cir.1995). This duty likewise applies to reexamination proceedings. 37 C.F.R. § 1.555 (2002). A breach of this duty can take several forms, including the failure to disclose material information. *Molins,* 48 F.3d at 1178, 33 USPQ2d at 1826. Further, a breach of this duty, when coupled with an intent to deceive or mislead the PTO, constitutes inequitable conduct, which, when proven, renders the patent unenforceable. *Id.* at 1178, 33 USPQ2d at 1827.

To establish Marlow's inequitable conduct, Igloo must show by "clear and convincing evidence" that Marlow failed to disclose material information with intent to deceive the PTO. *Kingsdown Med. Consultants, Ltd. v. Hollister, Inc.,* 863 F.2d 867, 872, 9 USPQ2d 1384, 1389 (Fed.Cir.1988); *FMC Corp. v. Manitowoc Co.,* 835 F.2d 1411, 1415, 5 USPQ2d 1112, 1115 (Fed.Cir.1987). Once the materiality of the information and Marlow's intent to mislead have been established, the district court must "weigh them to determine whether the equities warrant a conclusion that inequitable conduct occurred." *Molins,* 48 F.3d at 1178, 33 USPQ2d at 1827. Moreover, when balanced against high materiality, the showing of intent can be proportionally less. *Brasseler, U.S.A. I, L.P. v. Stryker Sales Corp.,* 267 F.3d 1370, 1381, 60 USPQ2d 1482, 1488 (Fed.Cir.2001).

*3 On appeal, Marlow maintains that the district court erred in granting summary judgment to Igloo because it raised genuine issues of material fact. According to Marlow, the district court impermissibly weighed the evidence regarding its failure to disclose information to the PTO, the materiality of the allegedly withheld information, and Marlow's intent to deceive the PTO. Igloo counters that Marlow has no additional evidence to offer that would warrant changing the district court's determination or that would otherwise merit further proceedings. After drawing all justifiable inferences in favor of Marlow, we conclude that there are no genuine issues of material fact with regard to Marlow's inequitable conduct and Igloo is entitled to judgment as a matter of law.

A

Marlow first argues that a genuine issue of material fact exists with regard to whether it withheld any information relating to the district court action from the PTO during the final reexamination. In this regard, Marlow notes that it advised the examiner that the '193 patent was the subject of an infringement action pending before the district court, the examiner was provided with copies of the particular documents relating to those proceedings

which Igloo believed relevant to the final reexamination, and the entire record was made available to the examiner by Marlow's and Igloo's disclosures.

Igloo maintains that Marlow never once apprised the examiner of the substance of the district court's claim construction of the '193 patent or even of the fact that the court had construed the patent. Igloo specifically contends that the district court correctly found that Marlow failed to submit the three disputed documents to the examiner.

The district court did not err in concluding that there was no genuine issue of material fact with respect to Marlow's failure to submit copies of the disputed documents to the examiner during the final reexamination. In its responses to Igloo's Requests for Admission Nos. 92-94, Marlow admitted that at the time of the issuance of the final reexamination, the file wrapper did not include copies of these documents. We reject Marlow's argument that a genuine issue of material fact exists as to whether it withheld any information relating to the infringement action from the PTO. Informing the examiner of the pending infringement action is not commensurate with bringing to the examiner's attention the district court's prior claim construction of the patent or disclosing the court orders embodying this construction. *See* Rohm & Haas Co. v. Crystal Chem. Co., 722 F.2d 1556, 1572-73, 220 USPQ 289, 302 (Fed.Cir.1983) (concluding that a presumption that an examiner was able to find, with his expertise and adequate time, the critical data when he was presented with a "mountain of largely irrelevant data" ignores the real world conditions under which examiners work). Moreover, the only document from the infringement litigation submitted to the examiner was Marlow's motion for partial summary judgment filed on September 25, 1997, which was included as an exhibit to Igloo's request for reexamination. This document, however, was filed in the district court more than six months prior to the court's initial construction of the '193 patent and, thus, had no bearing on the scope of the claims at issue during the reexamination proceedings.

B

*4 Marlow next argues that a genuine issue of material fact exists with regard to the materiality of the district court's claim construction orders. "Materiality is not limited to prior art but embraces *any* information that a reasonable examiner would be substantially likely to consider important in deciding whether to allow an application to issue as a patent." *GFI, Inc. v. Franklin Corp.*, 265 F.3d 1268, 1273, 60 USPQ2d 1141, 1143 (Fed.Cir.2001) (emphasis in original); 37 C.F.R. § 1.56(b) (2002).

Marlow contends that in reaching its finding that its previous orders were material to the examiner's final reexamination of the '193 patent, the district court erroneously assumed that: (1) the construction of claim 1, and thus claim 4, applied by the Board was in conflict with the district court's construction of claim 1; and (2) Marlow was attempting during the reexamination to avoid the district court's requirement that to infringe the '193 patent an accused device had to be capable of both heating and cooling. According to Marlow, it argued to the examiner that claim 1 could not require both "simultaneous" heating and cooling because that would be physically impossible, which is not inconsistent with the district court's interpretation of the claim.

Igloo responds that the district court correctly concluded that the disputed documents were material to the final reexamination because: (1) they bore directly on the scope of the claims that Marlow attempted to amend; and (2) Marlow's interpretation of the patent asserted before the examiner was inconsistent with the district court's construction of the patent and Marlow's acquiescence to that construction.

The district court did not err in concluding that there was no genuine issue of material fact with respect to the materiality of the April 3 and September 1, 1998, orders to the final reexamination from the standpoint of a reasonable examiner reviewing Marlow's proposed amendments. Faced with Marlow's attempts to amend claim language in the '193 patent, the examiner had to first construe the scope of the claims, including the specific language covering picnic boxes that are capable of both "heating and cooling," to determine whether the proposed "cools or heats" language would impermissibly enlarge the scope of the patent. *See* 35 U.S.C. § 305(a) (2002). In addition, the district court's two previous orders construing the '193 patent and concluding that picnic boxes that only cooled did not infringe the patent were binding on the examiner under the doctrine of issue preclusion. *See* *In re Freeman*, 30 F.3d 1459, 1466-69, 31 USPQ2d 1444, 1448-51 (Fed.Cir.1994) (concluding that the Board was bound by the district court's prior interpretation of the reissue claims under the doctrine of issue preclusion). Thus, a reasonable examiner would have been substantially likely to consider these two orders important in deciding whether to allow the amendments to issue.

*5 Moreover, contrary to Marlow's assertion, whether or not the Board, applying the same construction of claim 1 as the district court, found claim 4 equivalent in scope to claim 1 is irrelevant to the materiality inquiry. This court has articulated the materiality criterion as follows:

> [T]he standard to be applied in determining whether a reference is "material" is not whether the particular examiner of the application at issue considered the reference to be important; rather, it is that of a "reasonable examiner." Nor is a reference immaterial simply because the claims are eventually deemed by an examiner to be patentable thereover.

Molins, 48 F.3d at 1179, 33 USPQ2d at 1828 (citation omitted); *Perseptive Biosystems, Inc. v. Pharmacia Biotech, Inc.*, 225 F.3d 1315, 1322, 56 USPQ2d 1001, 1006 (Fed.Cir.2000) (stating that a patent may be valid and yet be rendered unenforceable due to inequitable conduct). Thus, that the Board's interpretation of the '193 patent may have been consistent with the district court's previous construction does not eviscerate the materiality of the previous orders from the viewpoint of a reasonable examiner in the first instance. Here, a reasonable examiner reviewing Marlow's proposed amendments would have considered the district court's prior construction of that patent important.

C

Lastly, Marlow argues that a genuine issue of material fact exists with regard to Marlow's intent to deceive the PTO. Intent to mislead does not require direct evidence, and is typically inferred from the facts. *GFI*, 265 F.3d at 1274, 60 USPQ2d at 1144. Intent may be inferred when a patent applicant knew, or should have known, that withheld information could be material to the PTO's consideration of the patent application. *Critikon, Inc. v. Becton Dickinson Vascular Access, Inc.*, 120 F.3d 1253, 1256-57, 43 USPQ2d 1666, 1668-69 (Fed.Cir.1997); *Brasseler*, 267 F.3d at 1375-76, 60 USPQ2d at 1484; *Merck & Co. v. Danbury Pharmacal, Inc.*, 873 F .2d 1418, 1422, 10 USPQ2d 1682, 1686 (Fed.Cir.1989) (stating that intent is most often proven by a showing of acts the natural consequences of which are presumably intended by the actor).

Marlow argues that a factual dispute exists with regard to its alleged intent to deceive the PTO. According to Marlow, the district court found intent by incorrectly assuming that claim 4 is broader than claim 1 and by disregarding the affidavit of Marlow's attorney denying an intent to deceive.

Igloo argues that the district court correctly concluded that Marlow acted with intent to deceive the PTO. According to Igloo, Marlow knew, or should have known that the examiner would have considered the district court's claim construction of the '193 patent (specifically its holding that cool only or heat only devices cannot infringe the '193 patent) material to Marlow's attempts to add claims directed to cool only or heat only devices. Igloo further contends that the affidavit of Marlow's counsel does not create a genuine issue of fact as to Marlow's intent because it consists of mere denials of an intent to deceive.

*6 The district court did not err in concluding that there was no genuine issue of material fact with respect to Marlow's intent to deceive the PTO by failing to submit the district court's prior orders construing the claims of the '193 patent when it proposed amended language during the final reexamination. The same attorney represented Marlow before the district court in this case and before the PTO during the final reexamination proceedings. *See Critikon*, 120 F.3d at 1257, 43 USPQ2d at 1669 (noting that the patent counsel who were handling the reissue proceedings were keenly aware of the ongoing district court litigation and the issues involved prior to the resolution of the reissue proceedings). Yet, despite the district court's prior holding that a picnic box had to both heat and cool to infringe the '193 patent, Marlow proposed claims using the disjunctive language of "cools or heats." *See In re Freeman*, 30 F.3d at 1465, 31 USPQ2d at 1448 (stating that "given the interpretation of the district court during the infringement litigation, it is clear that the amendments to the independent claims during reexamination attempt[ed] an end run around the [district court's] interpretation"). Under these circumstances and in light of the binding nature of the district court's prior claim construction, Marlow's failure to submit the April 3 and September 1, 1998, orders leads to a finding that Marlow intended to deceive the PTO. As the district court recognized when considering Igloo's inequitable conduct motion, Marlow should have known that a patent examiner would have found the two prior court orders considering the construction of the '193 patent material to the reexamination. Indeed, during the pendency of the reexamination, Igloo's counsel twice reminded Marlow by letter of its duty to disclose the district court's claim construction to the examiner. The only evidence Marlow offers to negate a finding of an intent to deceive is an affidavit from its counsel denying such deceitful intent. However, a mere denial of an intent to deceive is not sufficient where a

patentee faces a high level of materiality and proof that it knows or should have known of that materiality. *Critikon*, 120 F.3d at 1257, 43 USPQ2d at 1669 (citing *FMC Corp* ., 835 F.2d at 1415, 5 USPQ2d at 1116).

CONCLUSION

In sum, we conclude that viewing the evidence in the light most favorable to Marlow, there is no genuine issue of material fact as to the materiality of the district court's April 3 and September 1, 1998, orders to the final reexamination of the '193 patent and Marlow's intent to deceive the PTO. Furthermore, the district court did not abuse its discretion in holding the '193 patent unenforceable. Accordingly, we affirm the district court's order granting summary judgment of invalidity to Igloo.

2003 WL 21212626 (Fed.Cir.)

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